Department of the Army
Program Manager for
Chemical Demilitarization
Aberdeen Proving Ground, Maryland

Chemical Stockpile Disposal Project

Programmatic Process Functional Analysis Workbook (FAWB)

Book 26

Liquid Incinerator System

LIC

Revision 1, *Change 5*
December 22, 2003

NOTE: The LIC programmatic process FAWB applies to ANCDF, PBCDF, TOCDF and UMCDF.

ALL FAWB SYSTEMS

Book (Chapter[1])	System Identifier	FAWB Title
UTILITY SYSTEMS (Site-specific)		
1 (5.15)	NGLPG	Fuel Gas System (Natural Gas and Liquefied Petroleum Gas)
2 (5.14)	HYPU	Hydraulic Power Unit and Distribution System
3 (5.19)	BCS	Bulk Chemical Storage System
4 (5.16)	CAS	Compressed Air Systems (Plant, Instrument, and Life Support)
5 (5.22)	SGS	Steam Generation System
6 (5.26)	DMS	Door Monitoring System
7 (5.28)	PCS	Primary Cooling Systems
8 (5.12)	EPS	Electrical Distribution and Emergency Power System
9 (5.13)	—	(HVAC FAWB moved to Book 20 (Process Systems))
10 (5.17)	WATER	Water Systems (Process Water, Potable Water, and Water Treatment Systems)
11 (5.21)	CDSS	Central Decon Supply System
12 (5.18)	TSHS	Toxic Storage and Handling Systems (Agent Collection, Spent Decon, and Sumps)
13 (5.20)	ACSWS	Acid and Caustic Storage and Wash System (DELETED[2])
14 (5.27)	FDSS	Fire Detection and Suppression System
15 -19	—	(not assigned; reserved for future use)
PROCESS SYSTEMS (Programmatic)		
20	HVAC	Heating, Ventilation, and Air Conditioning System
21	RHS	Rocket Handling System
22	PHS	Projectile Handling System
23	MHS	Mine Handling System
24	BCHS	Bulk Container Handling System
25	DFS	Deactivation Furnace System
26	LIC	Liquid Incineration System
27	MPF	Metal Parts Furnace System
28[3]	PAS/PFS	DFS, LIC and MPF Pollution Abatement System and PAS Filter System
29	BRA	Brine Reduction Area and BRA PAS
30	CHB	Container Handling Building
31	ACAMS	Automatic, Continuous Air-Monitoring System
32	TCE	Treaty Compliance Equipment
33[4]	DUN	Dunnage Incineration System and DUN PAS
34[3]	PFS	LIC, DFS, and MPF PAS Filter Systems (DRAFT only)

[1] TOCDF has original “chapter” numbers for utility system FAWBs.

[2] The ACSWS FAWB was deleted.

[3] The PAS and PFS FAWBs were combined into a single PAS/PFS FAWB (Book 28).

[4] A DUN FAWB is not being developed per direction of PM-CSD on 9-10-98.

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APPENDIXES

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FIGURES

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TABLES

REVISION LOG

REV.#	PAGE(S)	REFERENCE AND DESCRIPTION OF CHANGE
0	NA	Initial Issue
1	*ii, B-1, C-1, C-2*	*Updated to reflect current status of programmatic process FAWBs.*
	2-1 thru 2-3, 3-1, 3-13, 3-16, 3-17, 3-20, B-1, D-1	*Included description of PFS at ANCDF and PBCDF in addition to UMCDF.*
	2-3, B-2, H-1	*Deleted reference to AASS, which will not be used per PM-CSD memorandum.*
	3-4, 3-5, B-5	*ECP TEMP-2302-DFS – Elimination of dual-element thermocouples.*
	3-4, B-5, D-43	*Added FAWB Note discussing use of primary burner fireye bypass.*
	3-12, B-5, D-37	*ECP TEMP-2502-LIC – SRS slide gate interlocks.*
	B-6	*Added reference to ECPs TEMP-2591-LIC and TEMP-2592-LIC – LIC wide-range pressure transmitters.*
	3-2, 3-3, 3-5, 3-6, 3-8, 3-9, 3-15, 3-17, 3-18, 4-1, 4-2, B-2 thru B-6, App.C, App.D, App.E App.F, App.G, App. H	*Updated to reflect current source documentation (e.g., P&IDs, PLC code, and SOPs).*
	2-2, 3-2 thru 3-7, 3-13 thru 3-15, 3-18, 3-19, 3-20, D-2	*Discussion clarification.*
	Appendix A	*Updated with latest comprehensive acronym list.*
	Appendix C	*Created new site-specific A&I matrices for ANCDF, PBCDF and UMCDF based on latest source documentation, site-specific input, and ECPs UMAP688LIC for UMCDF RCRA AWFCOs and UMUF866LIC for UMCDF MACT AWFCOs.*
	Appendix E	*Added ANCDF screens.*
	H-1 thru H-4	*Updated to reflect current revisions of source documents. Added PM-CSD AASS memorandum, ANCDF PLC code, UMCDF Mass and Energy Balances, and drawings PB-1-E-906, TE-1-H-1/2, UM-1-E-905.*
1 CH 1	*Appendix C*	*Inserted revised UMCDF LIC A&I matrix per ECP UMSF1083LIC.*
1 CH 2	*C –3-8*	*Westinghouse Anniston Letter WSN-96-007830 – ANCDF Review of A&I Matrices for the MPF, MPF PAS, DFS, DFS PAS, LIC, and LIC PAS.*
	C –3-8	*Westinghouse Anniston Letter WSN-96-008536 – ANCDF Review of A&I Matrices for the LIC and LIC PAS per ECP-0993.*
	C –22-33	*Inserted revised UMCDF A&I matrices per ECP UMSF1199LIC which also split the UMCDF LIC matrix into separate matrices for LIC 1 and LIC 2.*
1 CH 3	*C –28-33*	*UMSF1199LIC corrections to UMCDF LIC 2 A&I matrix*

REVISION LOG (CONT'D)

REV.#	PAGE(S)	REFERENCE AND DESCRIPTION OF CHANGE
1 CH4	*C-3 thru C-8*	*Westinghouse Anniston Document Change Proposal #AN-04-012 – LIC – Corrected A&I Matrices to Reflect the As-Built and Tested Conditions.*
	C-3,4,6,8	*Westinghouse Anniston Document Change Proposal #AN-04-026 – Modification to the LIC FAWB Book 26 A&I Matrix under AN-1069-ECP.*
	C-3,8	*Westinghouse Anniston Document Change Proposal #AN-04-031 – Modification to the LIC FAWB Book 26 A&I Matrix under AN-1090-ECP.*
1 CH5	*3-8, C-7*	*Westinghouse Anniston Document Change Proposal #AN-04-039 – Modification to the LIC FAWB Book 26 A&I Matrix under AN-1125-ECP.*

SECTION 1
INTRODUCTION

1.1 CSD PROJECT BASELINE TECHNOLOGY OVERVIEW

The Office of the Project Manager for Chemical Stockpile Disposal (PM-CSD) is responsible for the disposal of the United States' existing unitary chemical weapon stockpile. PM-CSD manages execution of the design, construction, equipment acquisition/installation, systemization, plant operations, and closure of all CSD project sites.

The CSD project baseline technology consists of the following:

- mechanical disassembly or puncturing the munitions to remove chemical agent and any explosives or propellant,
- incineration of the chemical agent and any explosives and propellant, and
- thermal detoxification of metal parts and any contaminated dunnage.

This technology was demonstrated during a series of operational verification testing (OVT) campaigns at the Johnston Atoll Chemical Agent Disposal System (JACADS). JACADS represents the first generation of a full-scale facility implementation of the project baseline technology. JACADS continues to operate and dispose of the remaining chemical agent and munitions stockpiled at Johnston Atoll.

The second generation plants implementing the baseline technology include the following:

- Tooele Chemical Agent Disposal Facility (TOCDF), located at the Deseret Chemical Depot in Tooele, Utah;
- Anniston Chemical Agent Disposal Facility (ANCDF), located at the Anniston Army Depot near Anniston, Alabama;
- Umatilla Chemical Agent Disposal Facility (UMCDF), located at the Umatilla Chemical Depot near Hermiston, Oregon; and,
- Pine Bluff Chemical Agent Disposal Facility (PBCDF), located at the Pine Bluff Arsenal near Pine Bluff, Arkansas.

Unless otherwise noted, the programmatic functional analysis workbooks (FAWBs) for process systems apply to each of these CSD sites.

1.2 BACKGROUND

FAWBs for 25 plant systems were issued for JACADS in January 1985 by The Ralph M. Parsons Company (now the Parsons Infrastructure & Technology Group, Inc.). Parsons is the Design and Systems Integration Contractor (DSIC) for the CSD project. The FAWBs provided the basis for the facility control system's programmable logic

controller (PLC) and computer systems programming. The JACADS FAWBs were later revised by United Engineers & Constructors and, by the July 1989 issue, two additional systems had been added.

FAWBs for TOCDF were issued in April 1993 by Parsons. There were 28 plant systems defined for TOCDF; however, only 27 FAWBs were issued (The Residue Handling Area FAWB was not issued). Most of the TOCDF plant systems were the same as those for JACADS; however, there were some differences due to different plant configurations, system consolidations, and the inclusion of additional systems. The TOCDF systems contractor (SC) received the FAWBs and assumed responsibility for maintaining the set current with the TOCDF plant configuration and the evolution of its operational strategy. Utility system FAWBs also were developed for ANCDF, PBCDF and UMCDF. Their purpose is to assist the sites during utility systems equipment procurement, and to describe their use in facility operation. Utility system FAWBs are more site-specific, consist primarily of SC-procured equipment, and will be maintained by the individual demilitarization sites.

In September 1997, PM-CSD began the development of programmatic process FAWBs for process systems common to all sites, eliminating the need to maintain separate process FAWBs at each site. Having a single set of process FAWBs provides a means to ensure operational consistency between the sites and to accurately record differences between the demil facilities. The programmatic process FAWBs serve as an invaluable training tool for the Systems Contractor for Training (SCT) to ensure consistent training on process systems for all sites, and to quickly identify site-specific training requirements.

1.3 PROGRAMMATIC PROCESS FAWB SYSTEMS

Sixteen process systems having minimal differences between sites were designated as programmatic systems. These programmatic process FAWBs are maintained as a single reference rather than at each site. Minor site configuration differences between the sites are highlighted in the FAWB discussions and tables. Fourteen of these 16 systems were included in the 28 original plant system FAWBs developed by the DSIC. For conciseness, the dunnage incinerator (DUN) and DUN pollution abatement system (PAS) FAWBs were to be combined into a single FAWB, for a total of 15 programmatic process FAWBs. However, development of a programmatic FAWB for the DUN and DUN PAS was suspended indefinitely at the direction of the PM-CSD Operations Team (see FAWB Note B-1). In addition, FAWBs for the wet PAS and the PAS filter system (PFS) were combined into a single FAWB (see FAWB Note B-2). Therefore, a total of 13 programmatic FAWBs were developed for the process systems. The heating, ventilating, and air-conditioning (HVAC) FAWB originally was included as one of the utility system FAWBs produced for ANCDF in 1996 (HVAC FAWB was Book 9 for ANCDF Utility FAWBs). It has been recategorized as a process system and is included in the set of programmatic process FAWBs.

The programmatic process FAWBs are numbered in accordance with the convention established during production of the ANCDF and UMCDF utility system FAWBs. This convention reserves book numbers 1 through 19 for utility systems, and book numbers 20 through 34 for the process FAWBs. Programmatic process FAWB book numbers and

titles are listed in Table 1.1. The original TOCDF FAWB chapter numbers are shown for reference.

Twelve of the 28 original plant system FAWBs are designated as site-specific utility systems. For these systems, the SC is delivered an initial utility FAWB indicating the system design configuration and operational strategy. The SC maintains the utility FAWBs to reflect the site-specific configuration. The utility FAWBs are listed in Table 1.2; original TOCDF FAWB chapter numbers are shown for reference.

The two remaining systems of the 28 originally planned plant system FAWBs are the acid and caustic storage and wash system (ACSWS) (5.20) and the residue handling area (5.24). The ACSWS FAWB at TOCDF no longer is maintained and has not been developed for follow-on sites (see FAWB Note B-3). A FAWB for the residue handling area was not produced due to its lack of automatic control features.

Table 1.1 Programmatic Process FAWBs

FAWB Book #	FAWB Title (TOCDF FAWB Chapter #)
20	Munitions Demilitarization Building HVAC (5.13)
21	Rocket Handling System (5.1)
22	Projectile Handling System (5.2)
23	Mine Handling System (5.3)
24	Bulk Container Handling System (5.4)
25	Deactivation Furnace System (DFS) (5.5)
26	Liquid Incinerator (LIC) System (5.6)
27	Metal Parts Furnace (MPF) System (5.7)
28[1]	DFS, LIC, and MPF Pollution Abatement System and PAS Filter System (5.9)
29	Brine Reduction Area (BRA) and BRA PAS (5.23)
30	Container Handling Building (5.11)
31	Automatic Continuous Air Monitoring System (5.25)
32	Treaty Compliance Equipment (Not included in original FAWB)
33[2]	DUN System and DUN PAS (5.8 & 5.10)

[1] Per discussions held during the comment resolution matrix meeting for the PAS FAWB on 11-10-98, the draft programmatic process FAWBs for the PAS and PFS were combined into a single PAS/PFS FAWB, Book 28 (See FAWB Note B-2).

[2] As directed at the FAWB teleconference on 9-10-98, a programmatic process FAWB for the DUN/DUN PAS is not being developed (See FAWB Note B-1).

Table 1.2 Site-Specific Utility FAWBs

FAWB Book #	FAWB Title (TOCDF FAWB Chapter #)
1	Fuel Gas System (5.15)
2	Hydraulic Power Unit and Distribution System (5.14)
3	Bulk Chemical Storage System (5.19)
4	Compressed Air Systems (5.16)
5	Steam Generation System (5.22)
6	Door Monitoring System (5.26)
7	Primary Cooling System (5.28)
8	Electrical Distribution & Emergency Power System (5.12)
9	Not used; formerly HVAC
10	Water Systems (5.17)
11	Central Decon Supply System (5.21)
12	Toxic Storage and Handling Systems (5.18)
13	Not used; formerly acid and caustic storage and wash system
14	Fire Detection and Protection System (5.27)
15 - 19	Not assigned; reserved for future use

1.4 PROGRAMMATIC PROCESS FAWB PURPOSE

The programmatic process FAWBs serve as a repository for all control information for the automated aspects of the baseline technology demilitarization process systems. They serve as one of the source documents for PLC control system and computer system programming, operator training, and facility operation. These FAWBs also serve as programmatic reference documents that define how the process systems operate and capture the differences between facility operational configurations. Each programmatic process FAWB contains a subsection that defines the system boundaries and identifies the interfaces with other plant process and utility systems.

Programmatic process FAWBs are living documents, subject to configuration control under the CSD project Participant Quality Assurance Plan. They are meant to be continuously updated with user input whenever system modifications are made, or as needed to enhance the information presented. Programmatic process FAWB revisions are implemented as outlined in Section 1.6. The process by which the SCT maintains the programmatic process FAWBs and the roles and responsibilities of each organization affiliated with the CSD project are described in detail in the Programmatic Process FAWB Maintenance Plan.

Programmatic Process FAWB Limitations

Even though the FAWBs contain detailed descriptions of the configuration and control for each process system, they are not all-inclusive. Every effort is made to include the

level of detail necessary to fully describe the specific operating configuration for each process system. Each process FAWB includes supporting references to direct the user to relevant programmatic and site-specific documentation (e.g., standing operating procedures, drawings).

Because of the revision cycle time, there will be a slight lag time between recent changes and their reflection in the FAWB. Maintenance of the FAWBs will be done semiannually, or more frequently if needed, to reflect significant modifications.

The FAWB maintenance program relies heavily on input from each baseline technology demilitarization site. Timely and accurate input ensures that the FAWBs reflect the current configuration at each of the sites. All information received will be thoroughly reviewed to ensure consistent and accurate documentation.

As a programmatic document, the FAWBs describe the configuration and operation of four separate facilities. Care must be taken by the user to ensure that the information extracted from this document reflects the configuration for the facility of interest. Site-specific differences are highlighted in both the text and the appendices to avoid confusion.

1.5 PROGRAMMATIC PROCESS FAWB ORGANIZATION

The process FAWBs document the chemical demilitarization facility operations at ANCDF, PBCDF, TOCDF, and UMCDF. The format and structure of the programmatic process FAWBs differ from the original format prepared by the DSIC, and from the format previously maintained at TOCDF. The information from earlier versions has been retained and updated to reflect lessons learned from the design, construction, systemization, and operation of the demilitarization facilities, including JACADS and the Chemical Agent Munition Disposal System (CAMDS). The overall layout of the programmatic process FAWBs is shown in Table 1-3.

1.6 PROGRAMMATIC PROCESS FAWB REVISIONS

The programmatic process FAWBs are maintained by the SCT to reflect the operational and control system configuration at each CSD site that implements the baseline destruction technology. Each programmatic process FAWB will be reviewed and revised, as required, on a semiannual basis. Individual process FAWBs can be revised more frequently, if needed, to reflect significant configuration changes. Programmatic process FAWB modifications can be generated by the following:

- Engineering change proposals at any of the CSD sites
- CSD project programmatic lessons learned
- Operational modifications that do not involve configuration changes
- Programmatic changes
- Need for greater detail or clarification

The programmatic process FAWB maintenance plan identifies the organizations that participate in the FAWB maintenance program and the responsibilities of each to supply information that could result in revisions to the FAWB. All organizations are represented

on the FAWB Evolvement/Evaluation Team (FEET), and are involved with review of each FAWB revision to ensure that the site configuration and operating strategy is current.

Table 1.3 Organization of the Programmatic Process FAWBs

Section	Title	Contents
1	Introduction	General FAWB background, organization, and revision method
2	System Overview	Purpose of the system; operational and process design basis summary; system boundaries and interfaces
3	Process Description	Description of subsystems; control sequences
4	Component Summary	Tables listing parameters for primary components; power source listings
App. A	Acronyms and Abbreviations	
App. B	FAWB Notes	Notes that provide additional detail or background information
App. C	Alarm and Interlock Matrices	Programmatic matrices or matrices for each site
App. D	PLC Automatic Control Sequences	Automatic logic contained in the PLC code; burner management system automatic controls; sequencer logic for demil systems
App. E	Operator Screens	Advisor PC screens for each site
App. F	Instrument Ranges	Tables showing instrument ranges and setpoints
App. G	Intercontroller Communications	Tables listing the digital intercontroller inputs/outputs (DICIs/DICOs)
App. H	References	Listing of reference documents, including drawings, used to prepare and maintain the FAWB

SECTION 2
SYSTEM OVERVIEW

2.1 PURPOSE AND FUNCTION

The liquid incinerator (LIC) system disposes of agent and spent decontamination solution (decon) through high-temperature incineration. Agent collected from the demilitarization (demil) of munitions and bulk storage containers is stored in the toxic cubicle (TOX) until conditions are established for incineration in the LIC.

The LIC system consists of a refractory-lined, two-chamber furnace and associated subsystems. The LIC primary chamber destroys liquid nerve and mustard agents through high-temperature incineration. The LIC secondary chamber provides additional residence time for primary chamber exhaust gases. It also evaporates spent decon and destroys any organic material contained in it. TOCDF and UMCDF each have two LIC system furnaces, LIC 1 and LIC 2. ANCDF and PBCDF each have only one LIC system furnace.

LIC furnace exhaust flows to the LIC pollution abatement system (PAS) for cleansing prior to discharge to the atmosphere, or prior to additional treatment in the PAS filter system (PFS). *Each LIC furnace has its own dedicated PAS and PFS, except at TOCDF. Each TOCDF LIC only has a PAS (see FAWB Note B-4). A two-stage induced draft (ID) fan that is part of the LIC PAS at TOCDF, and part of the LIC PAS/PFS at the follow-on sites supplies draft for each LIC furnace.*

LIC operations are supported by two subsystems: 1) the LIC fuel oil/air purge system, and 2) the LIC slag removal system.

The LIC fuel oil/air purge system removes residual agent from the primary chamber agent feed line, downstream of the second safety shutoff valve. The line is flushed with compressed air from the plant air system (PLA) and with fuel oil at the end of an agent-burning operations. The flush is performed while the primary chamber is still at operating temperature to ensure that purged residual agent is burned in the primary chamber.

The LIC slag removal system (SRS) removes accumulated slag from the LIC. Slag is a mixture of liquid salts that results from the thermal destruction of decontamination solution. Slag produced in the LIC secondary chamber flows to the bottom of the chamber, where it collects in the slag extension. The control room (CON) operator removes the slag by using the LIC SRS. LIC SRS operation is supported by a dedicated air handling unit (AHU), described in the HVAC programmatic process FAWB, Book 20. The AHU cools sensors and provides cooling for barrels of slag removed in the SRS operation.

2.2 OPERATIONAL SUMMARY

Liquid agent (i.e., GB, VX, HD, HT or H) is pumped from the agent holding tank in the TOX, by an agent feed pump, to the LIC primary chamber. Agent is pumped at an agent-specific, uniform, continuous rate to the primary chamber where the agent is dispersed into the burner with air-atomizing nozzles and mixed with combustion air. Fuel gas is used to

ensure a stable flame pattern within the primary burner and to control chamber temperature. Operating temperature is maintained at about 2700°F.

Furnace draft for each LIC system is supplied by a two-stage ID fan consisting of two independent, adjustable-speed drive (ASD) blowers, except at TOCDF. At TOCDF, furnace draft for each LIC system is supplied by a single-speed, two-stage ID fan, which is part of the LIC PAS.

Exhaust gases from the LIC primary chamber are pulled by the ID fan through a refractory-lined crossover duct to the LIC secondary chamber. An excess of air is maintained in both LIC chambers to ensure complete agent destruction. A fuel oil/air purge system is provided to flush out any residual agent remaining in the LIC agent feed lines. Furnace operations are designed for remote operation from the CON.

Spent decon is pumped from any of three spent decon holding tanks in the spent decon system (SDS) and sprayed through an atomizing nozzle into the top of the LIC secondary chamber. If spent decon feed is not available, water is sprayed into the secondary chamber to control the temperature. Operating temperature in the secondary chamber is maintained at a minimum of 2000°F by a natural-gas-fired burner. The atomized fluid stream mixes with exhaust gases that are flowing from the primary to the secondary chamber. The water in the spent decon feed evaporates, any organic residue burns, and salts collect on the walls of the chamber. The salts melt and flow to the bottom of the chamber as slag. Slag periodically is removed through an opening in the bottom of the secondary chamber, where it is collected by the LIC SRS. *The exhaust gases flow to the LIC PAS for scrubbing and to the LIC PFS for carbon filtration, except at TOCDF. TOCDF only has a PAS.*

2.3 PROCESS DESIGN BASIS SUMMARY

Liquid agent and spent decon feed rates for the LIC chambers are based on the munitions being processed and the liquid agent and spent decon inventory. Fuel gas and combustion air feed rates are controlled based on the temperature of the respective outlet streams. The primary chamber, crossover duct, and secondary chamber, including downstream ducting, are refractory lined and designed to provide a minimum overall gas residence time of 2 seconds. The LIC primary chamber is designed to incinerate one agent at a time with the design agent flow rates listed in Table 2-1. *Site design flow rates differ because of elevation differences (i.e., ambient pressure differences) between sites.* The LIC secondary chamber is designed to process 2000 lb/hr spent decon.

Table 2.1 LIC Primary Chamber Design Agent Flow Rates (lb/hr)

Site	GA[1]/GB	VX	H	HD	HT
ANCDF	1015	675	NA	1290	1175
PBCDF	1050	700	NA	1330	1210
TOCDF	875	580	1160[2]	1110[2]	1010[2]
UMCDF	1030	680	NA	1305	NA

[1] The design basis for TOCDF included processing ton containers filled with GA and Lewisite. Since these bulk items will not be processed at TOCDF, Lewisite is not listed and GA is listed for information only.
[2] Resource Conservation and Recovery Act (RCRA) maximum feed rate for H/HD/HT at TOCDF is 1160 lb/hr.

2.4 SYSTEM BOUNDARIES AND INTERFACES

The LIC system consists primarily of the government-furnished equipment (GFE) that comprises the LIC furnace chambers and supporting components and instrumentation. The primary interfaces include the following *(see FAWB Note B-5)*:

(1) Agent/Spent Decon Feed: Feed to the LIC primary chamber is liquid agent and feed to the secondary chamber is spent decon. Dedicated pumps transfer the liquid agent from the TOX and spent decon from the SDS to the LIC. Either or both feed streams can operate at a given time. The liquid flows are atomized with air from the PLA as they are introduced into the combustion air flows and, thence, into the hot chambers. The PLA is reduced in pressure before being used as atomizing air.

(2) PAS*/PFS*: Hot exhaust gases around 2000°F from the LIC secondary chamber move to the LIC PAS for scrubbing and to the LIC PFS for carbon filtration, *except at TOCDF* (see FAWB Note B-4). *A two-stage ASD PAS ID fan moves the gases through the LIC PAS and LIC PFS. At TOCDF, a two-stage, single-speed ID fan moves the gases through the PAS. TOCDF has no PFS.*

(3) Utilities: The LIC requires fuel gas, electric power, plant air, process water, and instrument air to operate. In addition, air is drawn into the secondary LIC room through a roof-mounted air filter unit. The air can be heated or cooled, as needed, before it enters the secondary LIC room. Air from the secondary LIC room moves to the primary LIC room through modulated ducts.

SECTION 3
PROCESS DESCRIPTION

3.1 INTRODUCTION

The LIC system is comprised of a primary chamber, secondary chamber, and LIC slag removal system for each furnace, and a LIC fuel oil/air purge system. TOCDF and UMCDF have two LIC furnaces, LIC 1 and LIC 2. The LIC fuel oil/air purge system has a common supply tank and pump that can supply fuel oil, through dedicated supply lines, to both LIC 1 and 2 primary chambers.

The LIC system is designed to continuously burn liquid agent and/or spent decontamination solution (decon). Liquid agent is pumped by an agent feed pump from the agent holding tank in the TOX to the LIC primary chamber. Spent decon, pumped from any of three spent decon holding tanks in the spent decon system (SDS), is sprayed into the top of the secondary chamber. During normal steady-state operation, feed from either or both of these streams can be operating. However, simultaneous processing is kept to a minimum in order to minimize the generation of slag *(Ref: PLL issues 97-30 and 97-31)*. *Exhaust gases are drawn into the LIC PAS and LIC PFS by the LIC two-stage induced draft (ID) fan for further treatment, except at TOCDF. TOCDF has no PFS (see FAWB Note B-4).*

The following sections describe the LIC subsystems and control sequences. TOCDF and UMCDF LIC 1 tag numbers are referenced in the text. The PBCDF LIC uses LIC 1 tag numbers. TOCDF and UMCDF LIC 2 tag numbers are referenced in brackets[ ]. The ANCDF LIC uses LIC 2 tag numbers.

3.2 DESCRIPTION OF SUBSYSTEMS

3.2.1 Primary Chamber

The LIC primary chamber LIC-FURN-101 [LIC-FURN-201] is a vertical, refractory-lined steel cylindrical chamber. The top of the chamber is flattened and flanged to provide access for refractory repair. A single low-velocity burner assembly is mounted to the lower wall of the primary chamber. The burner assembly consists of a windbox, dual-fuel injector, and a combustion zone. Combustion air is introduced through the windbox. Fuel gas, agent, and fuel oil are introduced through the injector, as needed. Atomization of the fuel occurs external to the injector nozzle tip, using atomizing air.

The LIC primary chamber pressure is maintained more negative than the primary LIC room (Primary chamber pressure is -4 to -7 in. wc. at TOCDF). Pressure instrumentation senses the chamber and room pressure and transmits the information to programmable logic controller (PLC) pressure controller 13-PIC-52 [13-PIC-706]. At TOCDF, where the LICs have single-speed ID fans, LIC primary chamber pressure is controlled by modulating ID fan inlet damper 13-PV-52 [13-PV-706] to maintain the setpoint in the pressure controller. At all other sites, LIC primary chamber pressure is controlled by modulating the speed of the adjustable-speed drive (ASD) ID fans to maintain the

setpoint in the pressure controller (see FAWB Note B-6). The ID inlet fan damper position remains fixed, based on the setpoint in damper controller 13-HIC-52 [13-HIC-706]. MANUAL operation mode, also available to operators, allows the LIC primary chamber pressure to be controlled in a manner similar to TOCDF. In MANUAL mode, ID fan speed can be maintained constant based on a speed entered into ID fan speed controller 24-HIC-777A [24-HIC-776A] for the first stage, and into ID fan speed controller 24-HIC-72A [24-HIC-714A] for the second stage. The ID fan inlet damper then can be manually positioned to maintain the desired pressure in the primary chamber.

Thermocouples in the crossover duct (i.e., LIC primary chamber exhaust duct) monitor the exhaust temperature, and maintain it at the setpoint by modulating the fuel gas supplied to the injector of the primary chamber burner assembly.

LIC primary combustion air blower LIC-BLOW-101 [LIC-BLOW-102], located in the primary LIC room, supplies room air through an inlet duct to the windbox of the primary chamber burner assembly (see Table 4.1). An annubar in the combustion air duct measures the airflow volume to the primary chamber. The PLC maintains the desired flow by modulating a flow-control valve in the duct. *The flow control valve is a tight-shutoff (TSO) type to prevent backflow from the furnace (see FAWB Note B-16). It also has linear flow characteristics to allow effective furnace temperature control during initial ramp up.* The controller sets the combustion airflow at a ratio of the fuel gas flow during furnace rampup and rampdown. At TOCDF, the combustion air setpoint corresponds to 140% of the air required for complete fuel combustion (see FAWB Note B-7). During agent incineration, the combustion airflow is held constant to facilitate pressure control through the LIC and LIC PAS. The fuel gas flow is modulated to maintain chamber temperature at 2700°F. To begin agent feed, the operator sets combustion airflow control to EXCESS AIR mode, and enters an agent-specific setpoint into the primary combustion-air flow controller 13-FIC-042 [13-FIC-743]. The setpoint for GB processing at TOCDF is 2500 standard cubic feet per minute (scfm).

The fuel gas distribution system supplies fuel to the munition demilitarization building (MDB) at 35 pounds per square inch, gauge (psig) header pressure. *Pressure regulator 13-PCV-154 [13-PCV-744] reduces the gas pressure to 5 psig, or to 6.5 psig at TOCDF, prior to supply into the MDB.* Fuel controls are located in the secondary LIC room, a Category C Area, for easier maintenance rather than in the primary chamber room, a Category A/B Area[1]. The fuel flow rate is measured by an orifice plate, and regulated by a flow controller through flow-control valve 13-FV-120 [13-FV-749]. Natural gas and liquefied petroleum gas (LPG) detectors are located in the primary LIC room to stop processing and alert the CON in the event that fuel gas is detected in the room. The detection of fuel gas in the primary LIC room above the setpoint stops agent feed, stops spent decon feed and switches over to water, and stops the fuel oil purge (see FAWB Note B-8).

Agent is supplied to the LIC primary chamber from the TOX. Agent flow control valve 13-FV-127 [13-FV-731] is located in the TOX. Agent feed block valves 13-XV-134A and -134B [13-XV-761A and –761B], *along with 13-XV-104 [13-XV-204] which is downstream*

[1] HVAC ventilation Categories A, B, A/B, C, D, & E are discussed in HVAC programmatic process FAWB, Book 20.

of 13-XV-134B [13-XV-761B], are located in the primary LIC room. Agent flow is measured by duplicate mass flowmeters 13-FE-127A and –127B [13-FE-731A and -731B]. Agent flowmeters are located in the munitions corridor at ANCDF and UMCDF, in the primary LIC room at PBCDF, and in the TOX at TOCDF (see FAWB Note B-9). Signals from these flowmeters are compared by the PLC. If they differ by more than 5%, the PLC ramps down agent feed to 0 lb/hr at the rate of 300 lb/hr/min, agent feed pump ACS-PUMP-101 [ACS-PUMP-201] or –102 (common spare) stops, and the block valves close. The PLC also averages the two flowmeter signals to control agent feed rate by modulating the control valve. The control valve is driven closed whenever the agent feed block valves close. Conversely, the control valve must be closed before the block valves can open. This avoids a flow surge when agent feed starts. When agent feed starts, the control valve ramps open, allowing agent flow to increase at the rate of 60 lb/hr/min until it reaches the operator-entered setpoint. The controller maintains constant agent flow at this setpoint. If the agent flow exceeds the maximum allowable RCRA-permitted feed rate, the PLC initiates an automatic waste feed cutoff (AWFCO). The PLC also receives and displays the totalized agent flow and sends this information to the process data acquisition and recording system (PDAR).

Agent gun pressure also is monitored to verify the integrity of the agent nozzle. If agent gun pressure is not above 5 psig when flow is above 500 lb/hr, the PLC initiates an AWFCO. This alarm is not enabled until 10 seconds after AGENT FEED is active.

The plant air system (PLA) supplies compressed air to the primary chamber for agent nozzle purge and agent atomization. Agent nozzle purge is accomplished through a ¾-in. PLA line that ties into the agent line, just downstream of the second agent feed block valve. When agent operations are finished and the agent feed block valves are closed, the PLC opens the purge air valve for 60 seconds to blow the agent from this section of line into the burner. If the purge air valve fails to close after completing the purge cycle, a malfunction alarm is generated. The purge air valve must close for the agent feed block valves to open.

The burner is equipped with a triple-tier, pressure-regulating arrangement on the PLA for agent atomization. The middle tier is no longer used for normal operation (see FAWB Note B-10). To cool the nozzle when agent is not being burned, the lowest pressure tier opens, supplying air at 5 psig. When the EXCESS AIR icon is initiated, low-pressure branch block valve 13-XV-126C [13-XV-735C] closes, and high-pressure branch block valve 13-XV-126B [13-XV-735B] opens, allowing 72 psig air to atomize agent flow to the burner. Pressure transmitter 13-PIT-128 [13-PIT-736] generates a low-pressure alarm anytime the line pressure is below *4* psig (10-second delay after burner start). *TOCDF also has a RCRA AWFCO alarm 13-PAL-128 [13-PAL-736] associated with the transmitter, set at 60 psig (see FAWB Note B-17).* Low-low pressure switches 13-PSLL-127A*, -127B,* and -127C [13-PSLL-737A*, -737B,* and -737C], downstream of the pressure transmitter, verify that the desired pressure is being supplied and, if the pressure drops below the setpoint, alarms, stops agent feed, stops spent decon feed, and stops fuel oil purge. *TOCDF no longer has alarm 13-PSLL-127C [13-PSLL-737C] (see FAWB Note B-17). 13-PSLL-127A and* -127B [13-PSLL-737*A and -737*B] also provide input to the burner management system (BMS). *13-PSLL-127A [13-PSLL-737A] is a hardwired permissive for agent feed and fuel oil purge. 13-PSLL-127B [13-PSLL-737B] is part of the* 3-P interlock (see Appendix D) *that* shuts down the burner if the pressure drops below *the switch setpoint (see Appendix C).*

The primary burner is supervised by a flame scanner unit that is hardwired to various safety functions through the BMS *(see FAWB Note B-18)*. *The unit is cooled by flowing instrument air through a vortex cooler connected to the protective cover on the scanner unit.* A flame safety shutdown system (FSSS) is located in the burner management panel. Through its connections to the PLC, the BMS controls all furnace purging and light-off operations. It controls the fuel and agent block valves, pilot valves, and burner igniter. The PLC controls the fuel and air control valves and the combustion air blower. The BMS signals the PLC to drive the controls to low fire, high fire, or auto at the proper stages of the ignition sequence, and monitors the combustion air blower, control valves, and airflows to verify they are in the correct state. If any safety interlock is violated, the BMS locks out the burner and signals the PLC to stop related equipment (see Appendix C). After the BMS locks out the burner, an operator must reset it before operation can continue.

Thermocouples in the crossover duct monitor the primary chamber temperature. Thermocouples imbedded in the duct's refractory wall are used during rampup and rampdown to monitor the refractory temperature and alert the CON operator to changes that exceed the design capability of the material. In this mode, the chamber temperature is controlled by the calculated average refractory temperature measured by two sets of thermocouples *(see FAWB Note B-19)*. Additional discussion related to furnace startup and shutdown is included in Section 3.3.

Refractory temperature change is not as critical above 1200°F. Thermocouples that protrude into the gas stream are used to provide a quick-responding indication of the chamber's temperature. Similar to control when using the refractory thermocouples, the signals from two sets of thermocouples *(see FAWB Note B-19)* are averaged to calculate the gas temperature used to control chamber temperature.

A high-high temperature switch, 13-TISHH-612 [13-TISHH-712], provides extreme temperature limit (ETL) protection for the LIC primary chamber. Actuation of the ETL temperature switch locks out the primary chamber burner, stops agent feed, stops spent decon feed and switches over to water, and stops fuel oil purge. The ETL shutdown is designed to protect the furnace equipment, and is tripped by a refractory thermocouple. The purge bypass switch associated with burner relight is taken from crossover duct gas stream thermocouple 13-TSLLL-610 [13-TSLLL-710].

Temperature control of the LIC primary chamber during both rampup and agent processing is maintained by modulating the fuel flow rate to the burner. The temperature controller receives the averaged signal of the two active thermocouples from the gas stream if above approximately 1200°F, or from the refractory if below (see Section 3.3). The temperature controller provides the output to the fuel gas flow controller. If the temperature is below the setpoint, the flow controller is modulated open; if it is above the setpoint, the flow controller is modulated closed.

3.2.2 Secondary Chamber

The LIC secondary chamber is a vertical, refractory-lined, carbon-steel, cylindrical chamber with a high-velocity burner mounted near the top of the chamber wall. The burner introduces combustion air and fuel gas into the chamber. The secondary chamber is flanged at the top, similar to the primary chamber. A liquid spray nozzle is mounted on the chamber roof; it introduces spent decon or process water, and atomizing air into the chamber. The

chamber temperature is measured by thermocouples on the exhaust duct and is controlled by modulating either the fuel supplied to the burner or the water supplied to the nozzle.

LIC secondary combustion air blower LIC-FURN-102 [LIC-FURN-202] is located in the secondary LIC room and supplies room air through an inlet duct to the secondary burner (see Table 4-2). An annubar in the combustion air duct measures the airflow volume to the secondary chamber. The PLC maintains the desired mass flow by modulating a flow control valve in the duct. *The TSO flow control valve prevents backflow from the furnace (see FAWB Note B-16). It also has linear flow characteristics to allow effective furnace temperature control during initial ramp up.* The controller sets the combustion airflow at a ratio of the fuel gas flow during furnace rampup and rampdown. During steady-state operation the combustion airflow is maintained at 40% or greater excess flow (i.e., 40% more air than theoretically required for complete combustion of all fuel in the feed) (see FAWB Note B-7).

Fuel gas is supplied to the secondary chamber through the fuel gas distribution system. *Pressure regulator 13-PCV-156 [13-PCV-789] reduces the gas pressure from the header pressure of 35 psig to 3 psig, or to 2.9 psig at TOCDF, prior to supply into the MDB.* The fuel gas valves and controls are located in the secondary LIC room, a Category C area. Fuel flow rate is measured by flow element 13-FE-070 [13-FE-787], and regulated by a flow controller through a flow-control valve. Like the primary LIC room(s), natural gas and LPG detectors are located in the secondary LIC room(s) to stop processing and alert the CON in the event that fuel gas is detected in the room (see Appendix C). The detection of fuel gas in the secondary LIC room(s) above setpoint stops agent feed, stops spent decon feed and switches over to water, and stops the fuel oil purge (see FAWB note B-8).

The secondary burner is supervised by a flame scanner unit that is hardwired to various safety functions through the secondary burner BMS. Through its connections to the PLC, the BMS controls all furnace purging and light-off operations. It controls the fuel and agent block valves, pilot valves, and burner igniter. The PLC controls the fuel and air control valves and the combustion air blower. The BMS signals the PLC to drive the controls to low fire, high fire, or auto at the proper stages of the ignition sequence, and monitors the combustion air blower, control valves, and airflows to verify they are in the correct state. If any safety interlock is violated, the BMS locks out the burner and signals the PLC to stop related equipment (see Appendix C). After the BMS locks out the burner, an operator must reset it before operation can continue.

Thermocouples in the LIC secondary chamber exhaust duct monitor the chamber temperature. The chamber temperature is controlled by the calculated average gas stream temperature measured by two sets of thermocouples *(see FAWB Note B-19)*. Thermocouples that protrude into the gas stream are used for chamber temperature control during all modes of operation (e.g., rampup, rampdown, processing) to provide a quick-responding indication of the chamber's temperature. Additional discussion related to furnace startup and shutdown is included in Section 3.3.

A high-high temperature switch, 13-TISHH-613 [13-TISHH-713], provides ETL protection for the LIC secondary chamber. Actuation of the ETL temperature switch locks out the *primary and* secondary chamber burner*s,* stops agent feed, stops decon feed by *switching* decon/water *three-way* valve *11*-XV-*102A* [*11*-XV-*762A*] *to water, and inhibits fuel oil*

purge of the agent line (see FAWB Note B-20). The ETL shutdown is designed to protect the furnace equipment, so it is tripped by a refractory thermocouple. To respond quickly to conditions in the chamber, all other interlocks trip from gas-stream thermocouples.

Spent decon and water are supplied to three-way valve 11-XV-102A [11-XV-762A], located in the TOX, that can be positioned to supply either spent decon or water, but not both, to the secondary chamber spray nozzle. A single pipe delivers the selected feed, spent decon or water, from the three-way valve in the TOX to the secondary chamber. Spent decon is used only if all process conditions are met, otherwise process water is used (see Section 3.3.4 and Appendix C). The spent decon flowrate*, as indicated by 13-FIT-102 [13-FIT-763],* is limited by RCRA permit at all sites*. See Appendix C for RCRA AWFCO setpoints.* A piston-operated shutoff valve in the secondary LIC room opens whenever the chamber temperature is above 1500°F to ensure liquid flow to the spray nozzle for cooling. The liquid flow is measured by a mass flowmeter in the secondary LIC room that directs a flow controller, which modulates a flow control valve in the liquid line in order to maintain the setpoint flow.

To process spent decon, the operator selects the DECON *FEED* icon from CON Advisor Screen *LF1 [LF2]*, which switches the three-way valve to the spent decon position. An interlock in the secondary burner BMS ensures that the secondary chamber burner is firing, and ensures that the exhaust to the PAS is above 1850°F, before the three-way valve is energized to initiate spent decon flow. After flow is established, the flow controller modulates the flow control valve to maintain the selected setpoint processing rate of spent decon. If flow rises above the setpoint, the valve is modulated closed, and if flow falls below the setpoint the valve is modulated open. During spent decon processing, chamber temperature is maintained by modulating the fuel flow rate to the burner. The fuel gas flow controller receives the averaged signal of the two active thermocouples. If the temperature is below the setpoint, the fuel gas flow control valve is modulated open, and if the temperature is above the setpoint the valve is modulated closed.

When spent decon is not being processed, the three-way valve is positioned to supply process water to the spray nozzle. The same flow control loop used for modulating the *spent decon* supply is used to modulate water flow to the nozzle. During this mode of operation, the secondary chamber temperature is maintained by modulating both water and fuel gas. As the chamber temperature increases from the control setpoint, the temperature controller modulates the fuel control valve closed, and the water controller modulates the water control valve open. If the temperature drops below setpoint, the temperature controller modulates the fuel control valve open, and the water controller modulates the water control valve closed. The setpoint of the water flow controller is determined based on the control variable (CV)[2] of the temperature controller. Specifically, the setpoint of the water flow controller is set to 100% minus the CV of the temperature controller, multiplied by the maximum water flow rate of 2250 lb/hr. Therefore, if the temperature controller CV is 40%, the water flow controller setpoint is set to (0.6 x 2250) 1350 lb/hr. The water flow

[2] CV refers to a loop control variable value and is expressed in percent, where 100% corresponds to the maximum output. It is the control output of the proportional integral derivative (PID) controller when in AUTOMATIC mode, or the control value as inserted by the operator in MANUAL mode. It represents the analog output to an analog controllable device.

rate is limited by the control code to a minimum of 215 lb/hr to cool the spent decon feed nozzle.

Thus, temperature control in the LIC secondary chamber is accomplished in two ways. When not processing spent decon, the chamber temperature is maintained by modulating the burner firing rate and the amount of water cooling in the chamber. The burner firing rate is modulated down, and the water spray is modulated open to quench the high-temperature exhaust gas from the primary chamber. When the chamber is processing spent decon, the burner firing rate is modulated to maintain temperature setpoint, and the spent decon feed is held constant.

Plant air is used to atomize the spent decon or water in the secondary chamber spray nozzle. A solenoid valve on the PLA supply line opens automatically whenever the secondary combustion air blower is running.

During periods of extended idle operation, and for combustion air blower turndown, the CON operator also can introduce air from the LIC secondary chamber combustion air duct directly into the secondary chamber by actuating a solenoid valve from Advisor Screen *L1S [L2S]*.

A refractory venturi in the exhaust duct is located at the outlet of the secondary chamber. This venturi produces a pressure drop that is used to measure the exhaust flow, which is used to calculate the gas residence time in the LIC furnace. The minimum permitted residence time is two seconds. The differential pressure signal is compensated for temperature and pressure, and the volumetric flow rate is converted by the LIC system PLC into residence time, to the nearest tenth of a second, and displayed on the CON Advisor Screen. High differential pressure across the venturi or a low residence time will stop LIC feed, and alarm in the CON.

3.2.3 LIC Fuel Oil/Air Purge System

The fuel oil/air purge system purges agent from the last segment of agent pipe before the LIC by flushing fuel oil and plant air through the agent feed line. The fuel oil/air purge is used prior to a planned furnace shutdown, while the primary chamber is still at operating temperature. It begins downstream of the last agent feed block valve for the LIC furnace and extends to the furnace's agent gun in the primary chamber, where the fuel oil is incinerated. The fuel oil is transferred by LIC purge fuel oil pump LIC-PUMP-104.

The purge air line connects with the fuel oil purge line to flush the same segment of the agent feed line and gun with plant air. The air purge is used whenever agent feed is stopped. When the agent block valves close, the PLC automatically opens the purge air valve for 60 seconds to blow the agent from this section of line into the burner. The air purge also is used prior to furnace shutdown before and after the fuel oil purge. At TOCDF, a low-pressure air connection to the fuel oil purge line also is provided in the LIC vestibule, to allow for purge of the fuel oil line from the vestibule to the agent gun.[3]

[3] The design for the follow-on sites does not include a low-pressure air purge of the fuel oil line prior to removing the spool piece. *At a Sept 2000 ANCDF LIC review meeting, ANCDF decided that they will generate a field ECP to add an air purge of the line. PBCDF and UMCDF systems contractor will review the ANCDF ECP for applicability to their sites.*

The purge is used to clear the line of fuel oil to prevent demilitarization protective ensemble (DPE) entrants with Butyl personal protective equipment (PPE) from getting exposed to fuel oil when disconnecting the flex hose.

Except for the common connection to the agent feed line, the fuel oil flushing system is independent of the purge air line. At TOCDF, LIC-TANK-104 is a designated, 280-gallon, aboveground fuel oil tank, located at the southeast corner of the MDB, specifically for the fuel oil purge operation. At other sites, fuel oil is supplied from the 4000-gal emergency generator underground fuel storage tank, OIL-TANK-101, to the primary chamber to purge the agent. A total of 3200 gallons of fuel oil is reserved for the emergency generators, and 800 gallons are available to purge the agent feed line. *At ANCDF, a total of 1940 gallons of fuel oil is held as a minimum reserve for the emergency generators, GEN-GENR-101 and GEN-GENR-102. A 60-gallon minimum is required to purge the agent feed line/injector and this volume must be available above the 1940-gallon generator reserve when processing agent.*

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The purge fuel oil pump can be started and stopped manually from a local station, as well as remotely from the CON. *At follow-on sites, a PLC interlock will be provided to automatically stop LIC-PUMP-104 after the LIC agent line has been purged with a predetermined quantity of fuel oil as measured by 13-FQI-720.* Fuel oil flow is indicated locally, and on the CON Advisor Screen (see FAWB Note B-11). At TOCDF, a PLC-controlled solenoid valve and manual isolation valves are located on the fuel oil line in an airlock adjacent to each of the primary LIC rooms. A downstream, PLC-controlled solenoid valve and two check valves also are located in the primary LIC room. At the other sites, air-operated, tight shut-off valves and manual isolation valves are located on the fuel oil line in the airlock, and dual-check valves are also located in the primary LIC room.

At TOCDF, for safety and surety control, a flex hose connects the fuel oil line and the agent feed line. When the agent line purging system is not operating, this flex hose is disconnected and the manual block valve upstream of the hose connection is closed to prevent agent contamination of the fuel line and storage tank that are outside the toxic areas of the MDB. The flex hose connection is in the airlock adjacent to both LIC 1 and 2 primary LIC rooms for easy accessibility by workers wearing PPE. With remote control of the agent line purging system, operators need not enter the primary LIC rooms during furnace operations.

At other sites, for safety and surety control, removable spool pieces or swing elbows will be added between the fuel line and the agent feed lines so that when the purging system is not operating, the removable spool piece or swing elbow will be removed and the line will be capped. This process prevents agent contamination of the fuel line and the storage tank outside the toxic areas of the MDB. An emergency manual shutoff valve is added on the fuel oil line outside the MDB's toxic area. The removable spool piece or swing elbow is located in the airlock adjacent to the primary LIC room(s) for easy accessibility by personnel in PPE.

Dual fuel oil purge block valves 13-XV-105A and -105B [13-XV-205A and -205B] at TOCDF, and 13-XV-723A and -723B [13-XV-726A and -726B] at other sites, are tied into the LIC primary chamber BMS. Conditions for admitting fuel oil into the furnace are similar to those for admitting agent, except that the CON provides a fuel oil purge permissive in place of an agent admission permissive.

Prior to each LIC furnace shutdown, the following steps are taken to clear the primary chamber of agent contamination, based on Operation 8 in the current TOCDF LIC SOP, TE-SOP-006:

1. An Outside Operator verifies fuel oil tank level and performs valve lineup in preparation for fuel oil purge.
2. The CON operator stops agent feed; the PLC purges the agent line with high-pressure plant air for 60 seconds.
3. After 15 minutes of LIC primary chamber operation at normal operating temperature with agent feed stopped, the CON operator manually purges the agent line with high-pressure plant air for at least 20 minutes.
4. A DPE entrant connects the fuel oil flex hose and opens the fuel oil purge line block valves in the LIC primary chamber room vestibule.
5. The CON operator selects the fuel oil purge icon and initiates fuel oil purge. The PLC opens 13-XV-105A/B [13-XV-205A/B], the fuel oil purge solenoid block valves and 13-XV-110, the air supply solenoid to the purge fuel oil pump. *An outside operator opens the fuel oil needle valve[4] to run fuel oil* through the agent feed line for one hour with a flow greater than 0.8 gpm and until the flow totalizer reaches 60 gallons.
6. The Outside Operator closes fuel oil and air supply valves associated with the fuel oil purge pump and performs a 5-minute manual air purge of the fuel oil line from the LIC vestibule to the agent gun.
7. A DPE entrant disconnects the fuel oil flex hose and closes the fuel oil purge line block valves in the LIC primary chamber room vestibule.
8. The CON operator purges the agent feed line with plant air for 20 minutes.
9. The CON operator ramps the primary chamber down.
10. After the LIC primary chamber room temperature is below 90°F, a DPE entrant pulls the agent gun from the LIC primary burner and stores it in the agent gun box in LIC primary chamber room.
11. The CON operator shuts the furnace down, after which the outside operator closes all block valves into the LIC and the LIC PAS.

3.2.4 LIC Slag Removal System

The LIC slag removal system (SRS) is used to remove slag from the bottom of the LIC secondary furnace(s). The SRS consists of an extended bottom to the LIC secondary chamber, slide gate, drill, conveyors, hydraulic lifts (i.e., scissors lifts), heating elements, 90° transfer points (i.e., lifts), and electrical resistance heaters.

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[4] TOCDF uses a fuel oil needle valve to ramp fuel oil flow up and down to prevent perturbations that can disrupt burner operation. Follow-on site designs do not have needle valves. ANCDF is investigating the addition of a metering valve or a variable-speed metering pump to allow controlled ramping of fuel oil flow to the burner.

The SRS is controlled as a batch process by the control system from the CON furnace console. The batch begins when the CON operator and the outside operator load from one to four empty, refractory-lined steel drums into the system; the batch ends when these drums are processed and unloaded from the system. No additional drums are loaded during the batch process.

At all sites except TOCDF, SRS area cooling is provided by dedicated air handling unit HVC-AIRH-119 [HVC-AIRH-120 for UMCDF LIC 2], located in the pit area in each secondary LIC room, except for the ANCDF secondary LIC room without an incinerator. At TOCDF the SRS heating, ventilation, and cooling system consists of a chilled-water unit, the SRS air-handling unit, and the incinerator heat load air-handling unit (see FAWB Notes B-12 and B-13). These systems are described in detail the HVAC programmatic process FAWB, Book 20.

3.2.4.1 Global Conditions of Operation

1. A drum transfer occurs only when the downstream conveyor has been started, confirmed running, and, if transferring to a lift table conveyor, the lift is in its proper position before starting the upstream conveyor.
2. Except for the drum staging conveyors and the cooling conveyor, a drum transfer to the downstream conveyor occurs only if the downstream conveyor is empty.
3. The conveyors run in forward to load the system with empty drums in the filling position, and in reverse to unload the system by removing filled drums from the MDB, and to index/position the empty drums for filling.
4. The equipment has Local/Off/Remote (LOR) switches for maintenance and test operations in the furnace rooms.
5. The CON normally runs the system. Drum conveying operations are automatic and the drum slag filling operation (control of slide gate and hammer drill) is remote-manual.
6. The SRS is operated with the LIC in idle, with no agent or spent decon being processed. To ensure the slag is decontaminated to the 5X level, the CON operator stops agent and spent decon feed, and the secondary chamber and slag extension are maintained at normal operating temperature for at least 15 minutes before tapping operations begin. The SRS is interlocked to the furnace to prevent agent or spent decon feed or fuel oil purge while tapping slag.

3.2.4.2 SRS Operation

Slag accumulates in an extension to the bottom of the LIC secondary chamber. During LIC operation three zones of electrical resistance heating elements maintain the extension in the slag-removal temperature range to between 1400 and 2000°F. These elements are used to heat up the extension after completion of the LIC secondary burner startup. When slag removal is planned, agent feed and spent decon feed are halted, and empty drums are moved into position in the following sequence (Note: conveyor names based on P&ID names may not match names used in TOCDF SOP):

1. The local operator places an empty drum on system-end conveyor LIC-CNVX-101 [LIC-CNVX-201].
2. The CON operator places the system in AUTO on Advisor Screen SR1 [SR2].
3. The CON operator loads the drum by selecting AUTO LOAD start and LOAD DRUM start on Advisor Screen SR1 [SR2]. The remaining steps in this sequence describe the automatic drum loading.
4. The system-end conveyor runs to move the drum to outside airlock door LIC-DOOR-101 [LIC-DOOR-201], and the conveyor stops.
5. The outside airlock door opens if inside airlock door LIC-DOOR-102 [LIC-DOOR-202] is closed since interlocks allow only one airlock door to be open at once (see Appendix D, Table D.5).
6. Airlock conveyor LIC-CNVX-102 [LIC-CNVX-202] and the system-end conveyors run to move the drum into the airlock.
7. When the drum is inside and clear of doors, the airlock and system-end conveyors stop and the outside airlock door closes.
8. The inside airlock door opens when the outside airlock door is closed and the first lift-table conveyor, LIC-CNVX-103 [LIC-CNVX-203], is fully raised.
9. The first lift-table conveyor and the airlock conveyor run to move the drum onto the first lift-table conveyor.
10. When the drum is sensed on the first lift-table conveyor, the conveyors stop and the inside airlock door closes.
11. The first lift-table conveyor lowers, and the CON operator uses the closed-circuit television (CCTV) to monitor the balance of the loading operation.
12. The second lift-table conveyor, LIC-CNVX-104 [LIC-CNVX-204], raises, and the first and second lift-table conveyors run to move the drum onto the second lift-table conveyor.
13. The first and second lift-table conveyors stop, and the second lift-table conveyor lowers.
14. The staging conveyor, LIC-CNVX-105 [LIC-CNVX-205], and the second lift-table conveyor run to move the drum onto the staging conveyor.
15. When the drum is sensed on the staging conveyor, the conveyors stop and the first conveyor lift, LIC-CNVX-106B [LIC-CNVX-206B], raises.
16. The first conveyor lift and the staging conveyor run to move the drum over to transfer conveyor LIC-CNVX-106A [LIC-CNVX-206A].
17. The first conveyor lift and the staging conveyor stop, and the first conveyor lift lowers to place the drum onto the transfer conveyor.
18. The transfer conveyor runs to move the drum over the second conveyor lift.

19. The transfer conveyor stops, and the second conveyor lift raises and lifts the drum off the transfer conveyor.

20. Loading conveyor LIC-CNVX-107 [LIC-CNVX-207] and the second conveyor lift run to move the drum onto the loading conveyor.

21. The loading conveyor stops.

Up to three more empty drums can then be loaded onto the system in the same sequence, except that the previous drums are moved from the first loading conveyor, LIC-CNVX-107 [LIC-CNVX-207], onto the remaining loading conveyors, LIC-CNVX-108, -109, and –110 [LIC-CNVX-208, -209, and –210]. The system is now ready for slag removal operations.

To initiate a slag removal cycle, the CON operator confirms that a drum is in position on the first loading conveyor using the CCTV, and then opens slide gate LIC-GATE-101 [LIC-GATE-201]. If a drum is not present, an interlock prevents actuation of the slide gate. The drum is filled to within 3 in. of the top of the drum, and the operator closes the slide gate. If a material plug prevents the slag from flowing, the CON operator removes the plug by initiating operation of hammer drill LIC-DRIL-101 [LIC-DRIL-201]. The hammer drill is interlocked with the slide gate to prevent operation if the slide gate is closed, and the slide gate is interlocked to prevent its closing if the hammer drill is not fully retracted. *At TOCDF, an emergency bypass was added to allow an operator to manually close the SRS slide gate even if the hammer drill is not fully retracted (see FAWB Note B-21).*

When the drum is full, the slide gate is closed, and slag flow has been verified to have stopped, the CON operator initiates automatic transfer of the filled drum to the drum cooling area on staging conveyor LIC-CNVX-105 [LIC-CNVX-205] by selecting AUTO UNLOAD start and XFER DRUM start on Advisor Screen SR1 [SR2]. In addition to moving the full drum, the XFER DRUM command also moves the three empty drums in reverse on loading conveyors LIC-CNVX-108, -109, and –110 [LIC-CNVX-208, -209, and –210] so that the first drum moves into loading position on the first loading conveyor and the other drums move one position closer to the loading position. The drum filling process is repeated for the second drum on the first loading conveyor. When completed, the CON operator issues another XFER DRUM command, and the second full drum moves to the staging conveyor. The first filled drum moves one position on the staging conveyor when the conveyor is started in reverse to accept the second drum. The next empty drum is filled in the same manner as the first two, and also is moved to the staging conveyor. When a fourth empty drum is filled on the first loading conveyor, it is left in the loading position for cooling.

After the drums are sufficiently cooled, an outside operator enters the LIC secondary chamber room, places lids on the drums, and notifies the CON operator. The CON operator selects AUTO UNLOAD start and UNLOAD DRUM start on Advisor Screen SR1 [SR2] to initiate automatic transfer of the filled drums to system-end conveyor LIC-CNVX-101 [LIC-CNVX-201], where an outside operator uses the overhead crane to load the drum onto a transfer vehicle for movement to a storage/disposal area. When all the drums have been removed to storage, the CON operator notifies the Monitoring Branch that the drums are ready for sampling. The batch process is then complete.

3.3 CONTROL SEQUENCE LIST

The following sections present the control sequences for LIC startup, agent feed, stop agent feed, spent decon feed, stop spent decon feed, furnace relight, normal shutdown, and emergency shutdown. The control sequences are based on the TOCDF SOPs, and on PLC and BMS logic.

3.3.1 LIC Startup Sequence

The LIC CON operator proceeds as follows when the PAS NORMAL[5] signal *at TOCDF*, or the *PAS/PFS NORMAL* signal *at other sites,* is received (see FAWB Note B-4):

1. Verify the valve lineup for fuel gas, process water, instrument air, and plant air. Verify secondary chamber spent decon/water feed flow controller, 13-FIC-102 [13-FIC-763], secondary chamber feed isolation valve, 13-XV-99 [13-XV-766], and secondary chamber atomizing air valve, 13-XV-62 [13-XV-768] are in AUTO.

2. Place LIC primary furnace Advisor Screen L1P [L2P] in AUTO. If the PAS NORMAL *at TOCDF*, or the *PAS/PFS NORMAL* at *other sites*, condition still exists, primary burner combustion air blower LIC-BLOW-101 [LIC-BLOW-201] starts.

3. Place LIC 1 secondary chamber Advisor Screen L1S [L2S] in AUTO. Secondary burner combustion air blower LIC-BLOW-102 [LIC-BLOW-202] starts*, and LIC secondary chamber atomizing air block valve 13-XV-062 [-768] opens*. The PLC automatically initiates a system purge as follows when primary combustion air and secondary combustion air blowers are running and the PAS NORMAL signal *at TOCDF*, or the *PAS/PFS NORMAL at other sites*, interlock is satisfied:

   a. The PLC drives the primary and secondary combustion air valves to high-fire position.

   b. An eight-minute[6] purge timer starts when both combustion air valves are at high fire and system purge minimum flow switch 24-FSL-438 [24-FSL-901] clears. At TOCDF, the system purge minimum flow switch is 24-FSL-431.

   c. After the eight-minute purge is complete, the PLC drives the primary and secondary combustion air and fuel-gas control valves to low-fire position. The fuel-gas valve should already be at low-fire since that is its default position.

[5] PAS NORMAL is defined in Appendix D, Table D-2.

[6] The eight-minute purge time was specified to provide at least four changes of furnace system volume prior to lighting the burners, per NFPA 86. The timer value may change for sites with a PFS due to the volume added to the system by the LIC PFS.

4. The CON operator must toggle the BURNER START switch from Advisor Screen L1S [L2S] to initiate the following secondary burner light-off sequence since burner light-off is not automatic:

   a. The BMS verifies all fuel-gas valve and running interlocks are satisfied.

   b. The BMS energizes the secondary burner igniter.

   c. The BMS opens the pilot fuel-gas solenoid valve for trial of pilot flame.

   d. The BMS flame scanner verifies flame presence within ten seconds or the burner will lockout.

   e. If the pilot flame is proven present, the BMS opens the main fuel-gas control valves for trial of main-burner flame.

   f. Ten seconds after the main valves open, the BMS closes the pilot fuel-gas valve, turns off the igniter, and sends a signal to the PLC to resume control of the air and fuel control valves in AUTOMATIC mode. The BMS flame scanner continues to monitor the flame strength, and will lock out the burner if the flame strength signal is insufficient.

   The operator verifies secondary burner light-off on Advisor Screen L1S [L2S] from BMS Message "Flame Signal XX" (Value XX must be >10 for an adequate flame). The LIC CON operator enters the setpoint of 2050°F on Advisor Screen LF1 [LF2] for secondary chamber gas temperature controller 13-TIC-103 [13-TIC-781]. The PLC begins to ramp the secondary chamber temperature toward 2050°F at 100°F/hr, as measured on gas temperature controller 13-TIC-103 [13-TIC-781]. During this rampup, the PLC uses a calculated, 40% excess-air value to determine the required combustion air control valve setting (see FAWB Note B-7).

5. The PLC starts water flow into the LIC secondary chamber when the refractory temperature in the secondary exhaust duct reaches 1500°F. The secondary chamber feed isolation valve opens at a minimum flow of 215 lb/hr, which allows process water to move into the secondary chamber feed nozzle.[7]

6. After the secondary gas temperature reaches 1400°-2050°F, workers in appropriate PPE enter the LIC primary chamber room and install the agent gun into the primary chamber burner.

7. The CON Operator verifies that the system purge is complete, primary and secondary combustion air control valves are at low-fire, fuel gas control valve is at low-fire, and furnace pressure is stable. Then, the CON operator

[7] When a new skim-coat has been applied to the LIC refractory, an alternate ramp-up procedure is followed in order to dry-out the new skim coat. For skim coat dry-out, the secondary chamber is ramped up to 2500°F, held at that temperature for five hours, and then ramped down to the normal operating temperature. For more information refer to LIC SOP TE-SOP-006, operation 15.

toggles the BURNER START switch from Advisor Screen L1P [L2P] to initiate the following primary burner light-off sequence since burner light-off is not automatic:

a. The BMS verifies all fuel-gas valve and running interlocks are satisfied.

b. The BMS energizes the primary burner igniter.

c. The BMS opens the pilot fuel-gas solenoid valve for trial of pilot flame.

d. The flame scanner verifies flame presence within ten seconds or the burner will lockout.

e. The BMS opens the main fuel-gas valves for trial of main-burner flame; fuel gas and combustion air control valves are at the low-fire position.

f. Ten seconds after the main valves open, the BMS closes the pilot fuel-gas valve, turns off the igniter, and sends a signal to the PLC to resume control of the air and fuel control valves in automatic mode. The BMS flame scanner continues to monitor the flame strength, and will lock out the burner if the flame strength signal is insufficient.

The operator verifies primary burner light-off from the BMS Primary Main Flame message. The operator enters a setpoint of 2700°F into primary chamber refractory temperature controller 13-TIC-125 [13-TIC-754], *and into gas temperature controller 13-TIC-043 [13-TIC-752].* The PLC holds the burner at low fire for *60* minutes if the reading on gas temperature controller 13-TIC-043 [13-TIC-752] is less than 500°F. If the reading is greater than 500°F, the *60*-minute hold timer is bypassed. Once either is satisfied, the PLC begins to ramp the primary chamber temperature toward 1200°F at 100°F/hr, as measured on the refractory temperature controller. During the rampup, the PLC uses a calculated, 40% excess-air value to determine the required combustion air control valve setting (see FAWB Note B-7).

8. At TOCDF, the LIC CON operator manually starts SRS chiller and chilled-water pumps when the LIC secondary chamber temperature reaches 500°F gas temperature controller on 13-TIC-103 [13-TIC-781]. This provides the SRS cooling plate with a setpoint of 10 gpm chilled water flow. At other sites, chilled water circulates continuously through the cooling coil, so this step is not necessary (see FAWB Note B-13).

9. The LIC CON operator manually starts the SRS extension heaters.

10. When the primary refractory temperature reaches 1200°F, the PLC maintains that temperature for an eight-hour soak. During this soak, the PLC uses a calculated, 40% excess-air value to determine the required combustion air control valve setting (see FAWB Note B-7). After the soak, gas temperature controller 13-TIC-043 [13-TIC-752] controls the primary chamber temperatures.

11. The PLC initiates the final rampup for the primary chamber. During this rampup, the PLC uses a calculated, 40% excess-air value to determine the

required combustion air control valve setting (see FAWB Note B-7). The PLC ramps the primary chamber temperature toward 2700°F at 150°F/hr, as measured on gas temperature controller 13-TIC-043 [13-TIC-752].

3.3.2 LIC Agent Feed

When the LIC is at operating temperature, the LIC CON operator proceeds as follows:

1. Verify the following interlocks for processing agent are met:
   a. Primary chamber temperature is between 2550 and 2850°F.
   b. Secondary chamber temperature, measured at quench inlet, is between 1850 and 2200°F.
   c. TOX is normal.
   d. LIC PAS *at TOCDF,* and LIC *PAS/PFS at other sites,* is normal.
   e. The agent holding tank is above LO-LO level.
   f. LIC primary chamber combustion airflow must be at least 40% excess air (see FAWB Note B-7).
   g. PDAR is in operation.
   h. RCRA alarms are cleared, as verified on the RCA [RCD] Advisor Screen.
   i. No stop feed conditions are active, as verified on Advisor Screens L1SF1 [L2SF1] and L1SF2 [L2SF2].
   j. LIC burners are firing (see Appendices C and D).
2. Access LIC primary burner control Advisor Screen L1P [L2P] and energize the EXCESS AIR icon. This opens the block valve on the highest-pressure branch of atomizing air, allowing air at 72 psig to be supplied to the burner. Insert a setpoint into the primary combustion airflow controller, using 2500 scfm for GB processing at TOCDF. Verify that the combustion airflow increases to the setpoint. The additional air causes an increase in the fuel-gas input to maintain the temperature setpoint. Allow primary chamber temperature to stabilize at the setpoint.
3. Set the agent flow rate setpoint on 13-FIC-127 [13-FIC-731) within the processing range, based on the agent being processed (see Table 2.1).
4. Manually open the agent holding tank discharge valve on the ACS Advisor Screen; place this screen in AUTO to start the agent pump.
5. Select the AGENT FEED icon on Advisor Screen L1P [L2P].
6. The PLC ramps the agent flow controller setpoint to the operator-designated flow rate, while simultaneously modulating the fuel-gas flow rate to maintain the temperature setpoint. The ramp rate will be 60 lb/hr/min to the predetermined setpoint.

3.3.3 Stop LIC Agent Feed

The preferred method for stopping agent feed is to allow the PLC to slowly ramp down the feed rate. To do this, the operator selects an agent feed rate of 0 lb./hour on agent flow valve 13-FIC-127 [13-FIC-731] using Advisor Screen L1P [L2P], then monitors the combustion parameters as the feed rate ramps to zero, including a 60-second air purge after agent feed is halted. After zero flow is indicated, the operator manually closes agent flow valve 13-FV-127 [13-FV-731], then selects the AGENT FEED icon and presses STOP.

In an emergency situation, if an immediate cessation of agent feed is desired, the operator selects Advisor Screen L1P [L2P], selects the AGENT FEED icon, presses STOP, and then monitors the furnace parameters as feed is halted.

After agent feed is halted, the operator can leave the excess air icon active to aid in furnace pressure control, or the operator returns the combustion air controller to ratio control if agent feed is to be stopped for a significant time. To stabilize the control, the operator runs the furnace at temperature with the air under ratio control for at least fifteen minutes before any subsequent action.

If LIC agent feed suddenly stops while processing agent at significant flow rates (e.g., >100 lb/hr), the PLC *takes manual control of the gas temperature controller in an attempt to stabilize the burner flame and maintain primary chamber temperature. The PLC initiates a temporary recovery procedure and sets the controller output CV to a predetermined value* (see FAWB Note B-14). *After the recovery procedure is complete, the PLC returns the temperature controller to automatic and the controller maintains primary chamber temperature at the setpoint.*

3.3.4 LIC Spent Decon Feed

When the LIC is at operating temperature, the LIC CON operator proceeds as follows:

1. Verify the following interlocks for processing spent decon are met:
   a. Secondary chamber temperature, measured at the quench inlet, is between 1850 and 2200°F.
   b. LIC PAS *at TOCDF*, and LIC *PAS/PFS at other sites*, is normal.
   c. Open interlocks for one SDS tank drain valve are satisfied.
   d. SDS and PDAR are in operation.
   e. RCRA alarms are cleared, as verified on the RCA [RCD] Advisor Screen.
   f. No stop feed conditions are active, as verified on Advisor Screens L1SF1 [L2SF1] and L1SF2 [L2SF2].
   g. LIC secondary burner is firing (see Appendices C and D).
2. Access Advisor Screen SD1, SD2, or SD3. Place spent decon tank outlet valve LV-35, -38, or -71 in MANUAL and open the valve.
3. *Verify no Spent Decon Feed interlocks are active.*
4. *Access Advisor Screen SD1 and set PV-774 [PV-773] to 75%.*

5. *Access the LIC temperature control Advisor Screen LF1 [LF2]. Activate the DECON FEED icon to enable the spent decon feed pump permissive. Verify that the DECON FEED icon turns yellow.*

6. *Access Advisor Screen SD1 and place the screen in AUTO. Verify that the spent decon feed pump starts.*

7. *Access Advisor Screen LF1 [LF2]. Verify that the spent decon/PRW three-way valve position changes to spent decon flow, and that the DECON FEED icon turns green.*

8. *Set the spent decon flow rate setpoint within the processing range (TOCDF SOP range is 225 to 1790 lb/hr). Spent decon flow is ramped to the setpoint at approximately 1 lb/hr/sec. Simultaneous processing of agent and spent decon should be avoided as this causes increased slag formation and accelerates brick corrosion.*

9. *Access Advisor Screen SD1 and manually adjust PV-774 [PV-773] to maintain spent decon feed pump discharge pressure above the PSLL setpoint.*

10. *In AUTO, the PLC modulates the secondary chamber firing rate to maintain the 2050°F exhaust gas temperature; the spent decon feed rate is held constant.*

3.3.5 Stop LIC Spent Decon Feed

The operator de-energizes the *DECON FEED* icon, causing the *spent decon feed* pump to stop*, the SDS tank outlet valve to close,* and the three-way water/spent decon selector valve to select water flow.

3.3.6 Furnace Relight

During normal operation, if any of the conditions for safe burner operation are upset, the BMS stops that burner and locks out (see Table D.6.) The PLC drives primary chamber combustion air control valve 13-FV-042 [13-FV-743], secondary chamber combustion air valve 13-FV-050 [13-FV-788], primary chamber fuel gas control valve 13-FV-120 [13-FV-749], and secondary chamber fuel-gas control valve 13-FV-70 [13-FV-787] to low-fire settings. Combustion air controller 13-FIC-042 [13-FIC-743] ramps the combustion air control valve to the low-fire position at a rate of 1% CV every three seconds. Lockout of either chamber burner will stop agent feed and fuel oil purge, and switch from spent decon feed to water.

Relight of a burner is as follows:

1. The CON operator verifies that venturi controller 24-PDIC-090 [24-PDIC-814] is in AUTO, that furnace pressure controller 13-PIC-052 [13-PIC-706] is ramping down to control furnace pressure, and that combustion air is at low fire. The CON operator then activates the burner RESET and START switches from the CON.

2. The PLC directs the BMS to initiate the following ignition sequence:

   a. Ensure running interlocks are made (see Appendix D), safety interlocks are closed, and fuel block valves are closed.

   b. Drive the combustion air control valve to high-fire position through the PLC. The BMS waits for the combustion air high-fire interlock to close. The high-fire interlock for the primary burner is closed if the system purge is maintained, meaning minimum exhaust flow is maintained and both combustion air blowers are operating.

      If the purge is maintained, the gas temperature is above 2000°F, and the refractory temperature is above 1400°F, combustion air will not ramp to high-fire. Instead, to reduce chamber cooling, the PLC will modulate the combustion air control valve to maintain 500 scfm.

   c. The primary burner is relit by following the burner light sequence in Section 3.3.1, Step 7. The secondary burner is relit by following the burner light sequence in Section 3.3.1, Step 4

      If the system purge was not maintained, then a system purge is required before the burner can be relit by following the burner light sequence in Section 3.3.1. Parameters required to maintain system purge are included in Appendix D, Table D.6.

3.3.7 Normal LIC Shutdown

A normal shutdown of the LIC furnace involves the following:

1. Remove any slag formed from processing agent and/or spent decon from the LIC secondary chamber using the SRS.

2. Complete the fuel-oil*/air* purge, as described in Section 3.2.3.

3. The CON operator enters a setpoint of 250°F for the LIC primary chamber into primary gas temperature controller 13-TIC-043 [13-TIC-752], and into primary refractory temperature controller 13-TIC-125 [13-TIC-754]. The controller ramps down furnace temperature at the same rate used for furnace warmup, 150°F/hr in the primary chamber, to protect the refractory from thermal shock.

4. The CON operator turns off the primary burner when the 150°F/hr cool down rate no longer can be maintained. The combustion air blowers continue to run to provide cooling air through the system. The combustion air control valves are automatically modulated to maintain the cooling rate at 150°F/hour until the refractory temperature reaches approximately 1100°F, as measured by refractory temperature controller 13-TIC-125 [13-TIC-754]. The cool down rate is controlled at 100°F/hr by the gas temperature

controller, unless the burner remains lit with the refractory temperature below 1120°F for 10 minutes.[8]

5. Any time the furnace is being shutdown, the agent gun is pulled by a DPE entrant. The work is performed with the secondary chamber temperature above 1400°F, and the primary chamber furnace room temperature below 90°F.

6. The CON operator enters a temperature setpoint of 250°F into secondary gas temperature controller 13-TIC-103 [13-TIC-781]. The controller ramps down furnace temperature at 100°F/hr, as measured by gas temperature controller 13-TIC-103 [13-TIC-781].

7. The CON operator turns off the secondary burner when the 100°F/hr cool down rate no longer can be maintained. The combustion air blowers continue to run to provide cooling air through the system. The combustion air valves are automatically modulated to maintain the cooling rate at 100°F/hour.

8. When the secondary chamber reaches 1430°F, the process water spray into that chamber is stopped.

9. When the primary gas temperature drops below 1000°F, as measured on 13-TIC-043 [13-TIC-752], the CON operator notifies the monitoring branch to shutdown the LIC continuous emission monitors in the PAS duct.

10. When the *LIC secondary chamber exhaust* temperature *is below* 200°F *as measured on 13-TIT-129 [13-TIT-782]* , the CON operator stops the LIC combustion air blowers, stops all operating components of the LIC PAS *at TOCDF*, or *PAS/*PFS at *other sites*, and turns off the low-pressure PLA to the LIC primary burner nozzle. The outside operator then closes all block valves for agent, fuel gas, spent decon, process water, plant air, instrument air, and fuel oil to the LIC system.

11. When the LIC secondary chamber slag removal extension temperature drops below 100°F, the CON operator removes the slag removal HVAC system from operation.

3.3.8 Emergency Shutdown

The CON operator can initiate a complete emergency shutdown of the LIC system by pushing the emergency stop (E-stop) button on a CON console. The CON E-stop cuts power to the BMS, stops the combustion air blowers, drives all valves to the safe position, and halts agent feed, spent decon feed, and slag removal equipment operation. *At all sites except TOCDF, after depressing the CON E-stop, the quench brine pump remains running, and one stage of the ID fan remains running along with the PFS equipment (e.g., PFS air*

[8] During normal shutdown, at the time that the operator shuts down the primary burner, the refractory is well above 1120°F. Therefore, cooldown of the primary chamber is normally accomplished exclusively with the gas controller.

coolers and reheaters), including the scrubber clean liquor pumps. At *TOCDF*, the E-stop stops all pumps in the LIC and LIC PAS, except for the quench brine pump.

An outside operator can initiate a LIC emergency shutdown by pushing the E-stop on the BMS panel. The BMS E-stop shuts down the primary burner and secondary burner, and stops agent feed, spent decon feed, and fuel-oil feed.

SECTION 4
COMPONENT SUMMARY

4.1 LIC SYSTEM COMPONENTS

The LIC system components are grouped by the four subsystems: primary chamber, secondary chamber, LIC fuel oil/air purge system, and LIC slag removal system.

4.1.1 Primary Chamber

The primary components of LIC primary chamber are the furnace chamber, the combustion air blower, automatic control and block valves, and associated temperature, pressure and flow instrumentation. Design parameters associated with the combustion air blowers are listed in Table 4.1.

Table 4.1 LIC Primary Combustion Air Blower Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	1	1	2	2
Tag #(s)	LIC-BLOW-201	LIC-BLOW-101	LIC-BLOW-101/201	LIC-BLOW-101/201
Blower Type	Motor-driven centrifugal	Motor-driven centrifugal	Motor-driven centrifugal	Motor-driven centrifugal
Rated Flow/ Δ Pressure[1]	3390 scfm/ 34 in. wc.	3200 scfm/ 34 in. wc.	3947 acfm/ 46.8 in. wc.	*3100* scfm/ *52* in. wc.
Motor Power	50 hp	50 hp	50 hp	50 hp
P&IDs	AN-1-D-546	PB-1-D-525	TE-1-D-526/546	UM-1-D-526/546

[1]At local atmospheric conditions.

4.1.2 Secondary Chamber

The primary components of LIC secondary chamber are the furnace chamber, the combustion air blower, automatic control and block valves, and associated temperature, pressure and flow instrumentation. Design parameters associated with the combustion air blowers are listed in Table 4.2.

Table 4.2 LIC Secondary Combustion Air Blower Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	1	1	2	2
Tag #(s)	LIC-BLOW-202	LIC-BLOW-102	LIC-BLOW-102/202	LIC-BLOW-102/202
Blower Type	Motor-driven centrifugal	Motor-driven centrifugal	Motor-driven centrifugal	Motor-driven centrifugal
Rated Flow/ Δ Pressure[1]	1366 scfm/ 44 in. wc.	1400 scfm/ 46 in. wc.	1450 scfm/ 54 in. wc.	*1400* scfm/ *46* in. wc.
Motor Power	25 hp	25 hp	30 hp	25 hp
P&IDs	AN-1-D-547	PB-1-D-526	TE-1-D-527*/1* TE-1-D-547*/1*	UM-1-D-527*/1* UM-1-D-547*/1*

[1]At local atmospheric conditions.

4.1.3 LIC Fuel Oil/Air Purge System

The primary components of LIC fuel oil/air purge system are the supply tank, the fuel oil purge pump, automatic control and block valves, and associated temperature, pressure and flow instrumentation. TOCDF is the only site that has a dedicated supply tank (280-gallon storage tank, LIC-TANK-104, at the southeast corner of the MDB). At other sites, fuel oil is supplied from the existing 4,000-gallon emergency generator's underground fuel storage tank (OIL-TANK-101). Design and operating parameters associated with the LIC purge fuel oil pump are listed in Table 4.3.

Table 4.3 LIC Purge Fuel Oil Pump Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	1	1	1	1
Tag #(s)	LIC-PUMP-104	LIC-PUMP-104	LIC-PUMP-104	LIC-PUMP-104
Pump Type	Motor-driven rotary	Motor-driven rotary	Air-operated diaphram	Motor-driven rotary
Rated Flow/ Δ Pressure	1.275 gpm/ 100 psi	1.275 gpm/ 100 psi	2.5 gpm/ 30 psi	2.55 gpm/ 102 psi
Motor Power	0.5 hp	0.5 hp	NA	0.5 hp
P&ID	AN-16-D-13	PB-16-D-13	TE-1-D-526	UM-16-D-13

4.1.4 LIC Slag Removal System

The primary components of LIC slag removal system are the slide gate, hammer drill, powered conveyors, conveyor lifts, lift table conveyors, airlock doors, heaters, overhead hoist, and associated instrumentation. Power source information for these components is listed in Table 4.4.

4.2 EQUIPMENT POWER SOURCES

Table 4.4 lists the equipment power sources for the major equipment used in the LIC furnace systems based on TOCDF drawings as of December 31, 1997 and the following construction revisions for the other sites: ANCDF (Construction Rev. 4), PBCDF (Construction Rev. 2), and UMCDF (Construction Rev. 2). Power sources are characterized as either critical, essential or utility. Critical loads are powered by the UPS panelboards and do not experience an interruption in power if offsite power is lost. Essential loads are required for safe shutdown of the facility, but can tolerate an interruption in power while being loaded on an onsite emergency diesel generator (EDG). Utility loads are not required if offsite power is lost and are not powered by the onsite EDG. Only motive power sources are listed in the tables; instrumentation and control power sources are not listed. In addition, hydraulically and pneumatically powered, and non-powered equipment are not included in the tables.

Table 4.4 LIC Equipment Power Sources

Equipment Tag	Description	Site(s)	Power Source	Power Type
LIC-BLOW-101	LIC (#1 at TE & UM) Primary Combustion Air Blower	TE/UM/PB	SPS-MCC-107	Utility
LIC-BLOW-102	LIC (#1 at TE & UM) Secondary Combustion Air Blower	TE/UM/PB	SPS-MCC-107	Utility
LIC-PUMP-104	LIC Purge Fuel Oil Pump	UM/AN/PB	SPS-MCC-107	Utility
		TE	NA (air-operated pump powered by plant air)	
LIC-CNVX-101	System End Conveyor	TE/UM/PB	LIC-PANL-103	Essential
LIC-CNVX-102	Airlock Conveyor	TE/UM/PB	LIC-PANL-103	Essential
LIC-CNVX-103	Lift Table Conveyor	TE/UM/PB	LIC-PANL-103	Essential
LIC-CNVX-104	Lift Table Conveyor	TE/UM/PB	LIC-PANL-103	Essential
LIC-CNVX-105	Staging Conveyor	TE/UM/PB	LIC-PANL-103	Essential
LIC-CNVX-106A	Transfer Conveyor	TE/UM/PB	LIC-PANL-103	Essential
LIC-CNVX-106B	Conveyor Lift	TE/UM/PB	LIC-PANL-103	Essential
LIC-CNVX-106C	Conveyor Lift	TE/UM/PB	LIC-PANL-103	Essential
LIC-CNVX-107	Loading Conveyor	TE/UM/PB	LIC-PANL-103	Essential
LIC-CNVX-108	Loading Conveyor	TE/UM/PB	LIC-PANL-103	Essential
LIC-CNVX-109	Loading Conveyor	TE/UM/PB	LIC-PANL-103	Essential

Table 4.4 (Cont'd)

Equipment Tag	Description	Site(s)	Power Source	Power Type
LIC-CNVX-110	Loading Conveyor	TE/UM/PB	LIC-PANL-103	Essential
LIC-DOOR-101	Airlock Door	TE/UM/PB	LIC-PANL-103	Essential
LIC-DOOR-102	Airlock Door	TE/UM/PB	LIC-PANL-103	Essential
LIC-HEAT-101	LIC Extension Heaters	TE	SPS-MCC-112 → LIC-PANL-101 → LIC-PANL-102	Essential
		PB	SPS-MCC-101 → LIC-PANL-101 → LIC-PANL-102	Essential
		UM	SPS-MCC-102 → LIC-PANL-101 → LIC-PANL-102	Essential
LIC-HEAT-102	LIC Extension Heaters	TE	SPS-MCC-112 → LIC-PANL-101 → LIC-PANL-102	Essential
		PB	SPS-MCC-101 → LIC-PANL-101 → LIC-PANL-102	Essential
		UM	SPS-MCC-102 → LIC-PANL-101 → LIC-PANL-102	Essential
LIC-HEAT-103	LIC Extension Heaters	TE	SPS-MCC-112 → LIC-PANL-101 → LIC-PANL-102	Essential
		PB	SPS-MCC-101 → LIC-PANL-101 → LIC-PANL-102	Essential
		UM	SPS-MCC-102 → LIC-PANL-101 → LIC-PANL-102	Essential
LIC-MONO-101 (LIC-MONO-401 at TOCDF)	Monorail Hoist	TE/AN/UM /PB	SPS-MCC-107	Essential
LIC-HYPU-101	Lift Table Hydraulic Power Unit	TE/UM/PB	LIC-PANL-103	Essential
LIC-HYPU-102	Lift Table Hydraulic Power Unit	TE/UM/PB	LIC-PANL-103	Essential
LIC-BLOW-201	LIC (#2 at TE & UM) Primary Combustion Air Blower	TE/AN/UM	SPS-MCC-107	Utility
LIC-BLOW-202	LIC (#2 at TE & UM) Secondary Combustion Air Blower	TE/AN/UM	SPS-MCC-107	Utility

Table 4.4 (Cont'd)

Equipment Tag	Description	Site(s)	Power Source	Power Type
LIC-CNVX-201	System End Conveyor	TE/AN/UM	LIC-PANL-203	Essential
LIC-CNVX-202	Airlock Conveyor	TE/AN/UM	LIC-PANL-203	Essential
LIC-CNVX-203	Lift Table Conveyor	TE/AN/UM	LIC-PANL-203	Essential
LIC-CNVX-204	Lift Table Conveyor	TE/AN/UM	LIC-PANL-203	Essential
LIC-CNVX-205	Staging Conveyor	TE/AN/UM	LIC-PANL-203	Essential
LIC-CNVX-206A	Transfer Conveyor	TE/AN/UM	LIC-PANL-203	Essential
LIC-CNVX-206B	Conveyor Lift	TE/AN/UM	LIC-PANL-203	Essential
LIC-CNVX-206C	Conveyor Lift	TE/AN/UM	LIC-PANL-203	Essential
LIC-CNVX-207	Loading Conveyor	TE/AN/UM	LIC-PANL-203	Essential
LIC-CNVX-208	Loading Conveyor	TE/AN/UM	LIC-PANL-203	Essential
LIC-CNVX-209	Loading Conveyor	TE/AN/UM	LIC-PANL-203	Essential
LIC-CNVX-210	Loading Conveyor	TE/AN/UM	LIC-PANL-203	Essential
LIC-DOOR-201	Airlock Door	TE/AN/UM	LIC-PANL-203	Essential
LIC-DOOR-202	Airlock Door	TE/AN/UM	LIC-PANL-203	Essential
LIC-HEAT-201	LIC Extension Heaters	TE	SPS-MCC-111 → LIC-PANL-201 → LIC-PANL-202	Essential
		AN/UM	SPS-MCC-101 → LIC-PANL-201 → LIC-PANL-202	Essential
LIC-HEAT-202	LIC Extension Heaters	TE	SPS-MCC-111 → LIC-PANL-201 → LIC-PANL-202	Essential
		AN/UM	SPS-MCC-101 → LIC-PANL-201 → LIC-PANL-202	Essential
LIC-HEAT-203	LIC Extension Heaters	TE	SPS-MCC-111 → LIC-PANL-201 → LIC-PANL-202	Essential
		AN/UM	SPS-MCC-101 → LIC-PANL-201 → LIC-PANL-202	Essential
LIC-HYPU-201	Lift Table Hydraulic Power Unit	TE/AN/UM	LIC-PANL-203	Essential
LIC-HYPU-202	Lift Table Hydraulic Power Unit	TE/AN/UM	LIC-PANL-203	Essential

APPENDIX A

Acronyms and Abbreviations

The acronyms and abbreviations listed below are common for all of the programmatic process FAWBs:

A&I	alarm and interlock matrix
AASS	automatic agent sampling system
ABCDF	Aberdeen Chemical Agent Disposal Facility
AC	alternating current
ACAMS	automatic, continuous air-monitoring system
acfm	actual cubic foot per minute
ACS	agent collection system
ACSWS	acid and caustic storage and wash system
ADC	air dilution controller
AgF	silver fluoride
AHT	agent holding tank
AHU	air handling unit
AMC	Army Materiel Command
ANAD	Anniston Army Depot (Alabama)
ANCDF	Anniston Chemical Agent Disposal Facility
ANSI	American National Standards Institute
AQS	agent quantification system
AR	Army Regulation
ASA	automatic submerged arc
ASC	allowable stack concentration
ASD	adjustable-speed drive
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	acid wash system
AWFCO	automatic waste feed cutoff
BCHS	bulk container handling system
BCS	bulk chemical storage
BDS	bulk drain station
BGCDF	Blue Grass Chemical Agent Disposal Facility
BLAD	blast load attenuation duct
BMS	burner management system
BPS	burster punch station (MIN)
BRA	brine reduction area
BRS	burster removal station (PMD)
BSA	buffer storage area
BSR	burster size reduction machine
Btu	British thermal unit
°C	degrees Celsius
CAMDS	Chemical Agent Munition Disposal System
CAB	combustion air blower

CAL	chemical assessment laboratory
CAS	compressed air system
CBR	chemical, biological, and radiological (filter)
CCB	configuration control board
CCS	central control system
CCTV	closed-circuit television
CDS	central decontamination supply
CDSS	central decontamination supply system
CDTF	Chemical Demilitarization Training Facility
CEHNC	U.S. Army Engineering & Support Center, Huntsville.
CEMS	continuous emission monitoring system
CFR	Code of Federal Regulations
CGA	Compressed Gas Association
CHB	container handling building
CHWS	chilled water supply
CO	carbon monoxide (monitors/analyzers)
COM	communications system
CON	control room
COR	munitions corridor
CPA	client-Parsons authorization
CRO	control room operator
CRT	cathode ray tube
CS	crimp station (PMD)
CSS	campaign select screen
CSD	Chemical Stockpile Disposal (Project)
CV	control variable
CWC	Chemical Weapons Convention
CWS	chilled water supply
DAAMS	depot area air monitoring system
db	dry bulb
DC	direct current
DCD	Deseret Chemical Depot
DDESB	Department of Defense Explosives Safety Board
decon	decontamination (solution)
demil	demilitarization
DFS	deactivation furnace system
DICI	digital intercontroller communication input
DICO	digital intercontroller communication output
DMS	door monitoring system
DPE	demilitarization protective ensemble (suit)
DSA	DPE support area
dscf	dry standard cubic foot
DSIC	design and systems integration contractor
DUN	dunnage incinerator
E&M	engineering and maintenance
E-stop	emergency stop
EAC	equipment acquisition contractor
ECF	entry control facility
ECP	engineering change proposal
ECL	engineering control level
ECR	explosive containment room

ECV	explosive containment vestibule
EDG	emergency diesel generator
EHM	equipment hydraulic module
EIC	equipment installation contractor
EPS	emergency power system
ETL	extreme temperature limit
°F	degrees Fahrenheit
FAWB	functional analysis workbook
FDLL	field design lessons learned (program)
FDPS	fire detection and prevention system
FEET	FAWB evolvement/evaluation team
FEM	fire extinguishing medium
FIFO	first-in-first-out
FIL	activated carbon and HEPA filter
FPD	flame photometric detector
fpm	feet per minute
FSSS	flame safety shutdown system
ft	feet
GA	general arrangement; nerve agent ethyl N-dimethylphosphoramidocyanidate ($C_5H_{11}N_2O_2P$)
gal	gallon
GB	nerve agent Sarin, isopropyl methyl phosphonofluoridate ($C_4H_{10}FO_2P$)
GC	gas chromatograph
GEN	emergency generator
GFE	government-furnished equipment
GLD	gross level detector
GPD	gas plasma display
gpm	gallons per minute
gr	grain
H	blister agent mustard, made by the Levinstein process, Bis(2-chloroethyl) sulfide or 2,2'-dichlorodiethyl sulfide ($C_4H_8Cl_2S_{1.5}$ [empirical formula])
H_3PO_4	orthophosphoric acid
HCl	hydrochloric acid
HD	blister agent distilled mustard, Bis(2-chloroethyl) sulfide or 2,2'-dichlorodiethyl sulfide ($C_4H_8Cl_2S$)
HDC	heated discharge conveyor
HDV	hydraulic directional control valve
HEPA	high-efficiency particulate air (filter)
HLE	high-level exposure
HOA	hand-off-auto
hp	horsepower
hr	hour
HRA	health risk assessment
HT	60% by weight blister agent distilled mustard and 40% agent T [Bis[2(2-chloroethylthio)ethyl] ether]
HVAC	heating, ventilating, and air-conditioning
HVC	heating, ventilating, and cooling
HYD	hydraulic power
HYPU	hydraulic power unit
HYVM	hydraulic control valve manifold
I/O	input/output

I-lock	interlock
IAS	instrument air system
icfm	inlet cubic foot per minute (acfm at the inlet)
ICS	instrumentation and control system
ID	induced draft
	inside diameter
IDLH	immediately dangerous to life and health
IGS	inertial gas sampling
in.	inch
in. wc.	inches water column
IR	infrared
ISO	International Standards Organization
JACADS	Johnston Atoll Chemical Agent Disposal System
kW	kilowatt
L	Lewisite (blister agent)
LAB	laboratory
lb	pound
lb/hr	pounds per hour
LCO	limiting condition of operation
ln	line
LIC	liquid incinerator
LIFO	last-in-first-out
LIT	level-indicating transmitter
LOQ	limit of quantification
LOR	local-off-remote
LPG	liquefied petroleum gas
LQCP	laboratory quality control plan
LR	local-remote
LSB	LSS bottle filling system
LSS	life support system
LVS	low volume sampler
mA	milliamperes
MCC	motor control center
MCP	monitoring concept plan
MDB	munitions demilitarization building
MDM	multipurpose demilitarization machine
MEL	master equipment list
MER	mechanical equipment room
mg/m^3	milligrams per cubic meter
MIG	mine glovebox
MIN	mine machine
MMS	mine and munitions system
MPB	munitions processing bay
MPF	metal parts furnace
MPL	multiposition loader
	maximum permissible limit (for DPE)
MPRS	miscellaneous parts removal station (PMD)
MSB	monitor support building
MSS	munition sampling system
NaOCl	sodium hypochlorite
NaOH	sodium hydroxide

NCRS	nose closure removal station (PMD)
NEMA	National Electrical Manufacturers Association
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NG	natural gas
NRT	near real time
O&M	operations and maintenance
OBV	observation corridor
ONC	onsite container
OS	orientation station (MIN)
OSHA	Occupational Safety and Health Administration
OVT	operational verification testing
P&A	precision and accuracy
P&ID	piping and instrument diagram
PA	public address
PAS	pollution abatement system
PBA	Pine Bluff Arsenal
PBCDF	Pine Bluff Chemical Agent Disposal Facility
PCS	primary cooling system
PCT	preconcentrator tube
PDAR(S)	process data acquisition and recording system
PDE	projectile deformation equipment
PDIT	pressure differential indicator transmitter
PDS	pull and drain station (MDM) punch and drain station (MIN)
PFD	process flow diagram
PFS	PAS filter system
pH	potential of hydrogen (a measure of acidity or alkalinity)
PHS	projectile handling system
PID	proportional integral derivative
pig	overpacked shipping container
PKPL	pick-and-place machine (also PPL)
PLA	plant air system
PLC	programmable logic controller
PLL	programmatic lessons learned (program)
PLS	proximity limit sensor/switch
PMB	personnel and maintenance building
PMCD	Program Manager for Chemical Demilitarization (formerly PEO-PM Cml Demil)
PM-CSD	Project Manager for Chemical Stockpile Disposal
PMD	projectile/mortar disassembly (machine)
PML	personnel, maintenance, and laundry (complex or building)
POT	potable water
PPL	pick-and-place machine
PPS	primary power system
PQAP	Participant Quality Assurance Plan
PRW	process water
PSB	process support building
psig	pounds per square inch, gauge
PSV	pressure safety valve
PUB	process and utility building
PUDA	Pueblo Depot Activity (Colorado)

PWR	power systems (unit substation, uninterruptible power supply, battery rooms, and emergency generator)
RCRA	Resource Conservation and Recovery Act
RDS	rocket drain station
RDTE	research, development, testing, and evaluation
RFI	Request for Information
RHA	residue handling area
RHS	rocket handling system
rpm	revolutions per minute
rps	revolutions per second
RSM	rocket shear machine
RSS	rocket shear station
SC	systems contractor
SCBA	self-contained breathing apparatus
scf	standard cubic foot
scfh	standard cubic feet per hour
scfm	standard cubic feet per minute
SCW	secondary cooling water
SCT	systems contractor for training
SDS	spent decon system
sg	specific gravity
SGS	steam generation system
SOP	standing operating procedure
SPS	secondary power system
SRS	slag removal system
TBD	to be determined
TCE	treaty compliance equipment
TEAD	Tooele Army Depot (Utah)
TIP	tray information packet
TM	Army Technical Manual
TMA	toxic maintenance area
TNT	trinitrotoluene (explosive)
TOCDF	Tooele Chemical Agent Disposal Facility
TOX	toxic cubicle
TSCA	Toxic Substances Control Act
TSHS	toxic storage and handling system
TSO	Tight shutoff
TWA	time-weighted average
UE&C	United Engineers and Constructors
UMCDF	Umatilla Chemical Agent Disposal Facility
UPA	unpack area
UPS	uninterruptible power supply
UV	ultraviolet
VCR	video cassette recorder
VX	nerve agent, O-ethyl S-(2-diisopropylaminoethyl) methylphosphonothiolate ($C_{11}H_{26}NO_2PS$)
wc	water column
WTS	water treatment system
XXX	3X level of decontamination
XXXXX	5X level of decontamination (minimum of 1000ºF for 15 minutes)
Z	general designation for monitoring hazard level

APPENDIX B

FAWB Notes

Appendix B contains notes to expand upon the descriptions contained in the text of the FAWB. The notes include related experiences at the Johnston Atoll Chemical Agent Disposal System (JACADS).

B-1 Per discussions held during the comment resolution matrix meeting for the HVAC FAWB on 9-10-98, the programmatic process FAWBs are being prepared under the assumption that the DUN, DUN PAS and DUN PFS (at ANCDF) systems will not be used for processing at any of the four sites. Therefore, a programmatic process FAWB for the DUN/DUN PAS/PFS is not being developed. Handling *and disposal* of dunnage are considered site-specific activities that have not yet been determined. *The DUN, however, is installed at TOCDF and remains in the designs at ANCDF and PBCDF. At UMCDF, the DUN was being removed from the design, however, its use at UMCDF is currently being studied. The DSIC is preparing a RCRA and design package for the UMCDF DUN, DUN PAS, and DUN PFS.*

B-2 Per discussions held during the comment resolution matrix meeting for the PAS FAWB on 11-10-98, the programmatic process FAWBs for the PAS and PFS are being combined into a single PAS/PFS FAWB that will apply to ANCDF, PBCDF, TOCDF, and UMCDF. Since TOCDF will not have a PFS, discussions related to the PFS will be applicable to ANCDF, PBCDF and UMCDF only. In the documentation used to develop the baseline programmatic process FAWB for the LIC, however, the PFS was only in the UMCDF design. Therefore, discussions in this FAWB indicate that the PFS exists only at UMCDF (see FAWB Note B-4 below)

B-3 The acid and caustic storage and wash system is no longer used at TOCDF and has been removed from the ANCDF, UMCDF, and PBCDF site designs by ECPs ANAC343PAS, R1, UMAC160PAS, R1, and PBAC340PAS, respectively.

B-4 *The PFS was incorporated into the ANCDF, PBCDF, and UMCDF designs under ECPs ANAC459PAS, PBAC406PAS and UMAC0193PAS, respectively. TOCDF will not have a PFS. Since the DUN PFS is unique to the DUN, it is considered part of the DUN system (see FAWB Note B-1).*

B-5 *The current ANCDF, PBCDF, and UMCDF design documents include an interface with the automatic agent sampling system (AASS), which is part of the treaty compliance equipment (TCE). PM-CSD issued a decision paper in October 1999 recommending that the AASS not be installed or be abandoned at ANCDF and UMCDF, depending on the construction status. The systems contractors are to revise the design documents. PM-CSD requested the Huntsville Corps of Engineers to direct the DSIC to prepare and implement an ECP to delete the AASS from the PBCDF design documents. The AASS will also be deleted from the TCE FAWB, programmatic process FAWB Book 32. The DSIC is deleting the AASS at UMCDF under ECP UMUF0799MSS (R1).*

B-6 Design documentation for ANCDF, PBCDF, and UMCDF indicates that there are two modes of automatic operation for furnace pressure control: 1) modulating the ID fan speed with the ID fan inlet damper at a preset position, or 2) modulating the ID fan inlet damper position with the ID fan at a preset speed. After discussions with the DSIC and EIC, it was decided that since speed control of the ID fans is the desired pressure control mode, furnace pressure control by modulating the ID fan inlet damper position would not be available as an automatic control mode (see RFI S-ALL-216). If furnace pressure control in this mode is desired, the operator can place the system in MANUAL, set the ID fan speed, and manually position the ID fan inlet damper to maintain the desired primary chamber pressure.

B-7 Follow-on site designs are based on operating with 20% excess air. The 40% excess air case has not been considered in the designs. The EIC, however, is implementing the TOCDF operational configuration (i.e., 40% excess air) in the PLC control code for the follow-on sites. *The DSIC preformed preliminary calculations for the 40% excess air case and found that the residence time would be reduced to 1.7 seconds, which is below the 2-second residence time requirement. In addition, the calculation indicated that the exhaust blowers may not have sufficient capacity to meet the increased excess airflow of 40% [Ref. Parsons FAX Log No. 17780, 11/03/99]. PMCD is currently investigating the basis for the 2-second residence time requirement.*

B-8 Stop feed signals initiated by the LIC furnace room (primary and secondary) fuel gas detectors are not currently shown on the design drawings for ANCDF *and* PBCDF. *UMAP833PAS added the primary LIC room gas detector stop feed at UMCDF. Addition of the UMCDF secondary LIC room gas detector stop feed has not yet been implemented.* The EIC will be including these stop feed signals in the control code for *all three* sites. *The change was approved by RFI S-ALL-0239. The DSIC has prepared ECPs ANAP1019PAS and PBAP797PAS and is awaiting approval to include this change in the ANCDF and PBCDF designs.*

B-9 TOCDF ECP TEAC-419-SRL specifies for the agent mass flow meters to be relocated to the lower munitions corridor, however, they are currently located in the TOX.

B-10 The middle tier for atomizing air was removed from service at TOCDF by ECPs EN-2233-R1 (TEMP-1890-MDB, R1) for LIC #1 and EN-2234-R1 (TEMP-1891-MDB, R1) for LIC#2. The middle tier remains operable at TOCDF, but serves only as a standby subsystem. The hardware for the middle tier will remain at follow-on sites; however, the control code will only use the highest and lowest tiers when supplying atomizing air. Operation can be switched manually to the middle tier if a particular agent operation requires atomizing air at a pressure other than supplied by the high-pressure tier. If the middle tier is used, the regulators and pressure switches would be adjusted to an optimal setting as determined in the field. The modification (discontinuation of middle tier use during normal operation) was implemented at follow-on sites by ECPs ANAP410LIC-R1 at ANCDF, PBAP369LIC-R1 at PBCDF, and UMAP191LIC-R1 at UMCDF.

B-11 An incident at JACADS on March 23, 1994, caused by incomplete diesel fuel purge resulted in chemical agent (GB) detection in the common stack. Future site designs include a flow meter that provides a purge oil flow signal to the PLC and a low flow alarm that will inform the CRO of the no or low diesel fuel flow situation in the agent feed line. If the diesel fuel line is blocked in the LIC room, the CRO will stop the diesel fuel purge pump.

B-12 Revision 2 of the TOCDF LIC FAWB, which was replaced by this programmatic FAWB, contained discussions on the slag removal system (SRS) heating, ventilation and cooling (HVC) system. Discussions on operation of the SRS HVC are being included in the programmatic process FAWB for the HVAC system.

B-13 Design modifications have been proposed by ECPs UMAC095LIC-R1, ANAC222LIC-R1, and PBAC279LIC-R1 to implement TOCDF as-built information on the LIC SRS, including a dedicated LIC chiller. *The ECPs for UMCDF and ANCDF are currently deferred by the CCB. PBCDF's ECP has been completed under Change Case 0073.*

B-14 TOCDF is in the processing of determining the optimal response for the primary chamber fuel flow control valve when agent feed is suddenly stopped while operating at high agent feed rates (>100 pph). *Recent changes were implemented under TEMP-2432-LIC and TEMP-2585-LIC. In the Feb 2000 TOCDF code used to prepare this FAWB, the LIC 1 response is to set the 13-TIC-043 CV to 10% for the first 12 seconds, then 25% for the next 3 seconds, and finally 52% for the next 15 seconds. At the end of these 30 seconds, 13-TIC-043 is returned to AUTO with a setpoint of 2700°F. The TOCDF LIC 2 response sets the 13-TIC-752 CV to 30% five seconds after agent feed is lost. 13-TIC-752 returns to AUTO 20 seconds after agent feed is lost, with a setpoint of 2700°F.* TEMP-2154-LIC was implemented to ensure that the agent block valves are open prior to adjusting the fuel gas CV in this fashion to prevent inadvertent system response due to noise on the agent flow transmitter.

B-15 The "FLOW LO LO" alarm for spent decon/water flow on Advisor PC screen LF1 [LF2] is activated by either 13-FSLL-230 [808] or 13-FALL-102 [763]. The hardwired flow switch (13-FSLL-230 [808]) and the software-generated alarm (13-FALL-102 [763]) have the same setpoint, 110 lb/hr.

B-16 At TOCDF, TEMP-1144-LIC R2 replaced combustion air valves 13-FV-042, -050, -743, and –788 with tight shutoff valves capable of linear flow characteristics. The ECP was reviewed by the design lessons-learned team and assigned to the EIC for action to implement at follow-on sites. The P&IDs for ANCDF, PBCDF, and UMCDF show these valves as a butterfly dampers with no indication of being tight-shutoff (TSO). Under RFI C-ALL-001, the DSIC found that the P&IDs need to be revised to show these valves as TSO ball-type valves in accordance with vendor specification sheets. ECPs will be prepared to implement the changes.

B-17 The February 2000 TOCDF PLC code and the January 2000 ANCDF PLC code have two alarms designated as 13-PAL-128 [-736]. One is a RCRA stop feed alarm set at 60 psig, and the other is an alarm only, set at 4 psig. In addition, there no longer is an alarm for 13-PSLL-127C [737C]. The RCRA alarm change from 13-PSLL-127C [737C] to 13-PAL-128 [-736] was made at TOCDF under TEMP-2337-LIC-R1. The site-specific systems contractors will determine the alarm configuration at follow-on sites.

B-18 TOCDF ECP TEMP-2029-LIC R1 installed a light source and second fireye scanner in the BMS panel to provide a simulated flame signal during agent feed operations. The simulated flame signal replaces the primary burner flame detector signal under specific operating conditions that are listed in Appendix D. JACADS installed a second, axially mounted flame scanner that is used when the fuel source is switched from propane (used during initial heatup) to JP-5. The axially mounted scanner remains active during agent feed. These modifications prevent flame-failure burner lockouts that can occur due to the weak flame-strength signal that is detected by the original, perpendicularly-mounted flame scanner during liquid fuel (i.e., JP-5 and agent) feed to the primary LIC burner. Bypass of the flame scanner at 1400°F is in accordance with NFPA 86-1995, Standards for Ovens and Furnaces, Section 5.9.1, Exception 1. Follow-on sites are reviewing the JACADS and TOCDF configurations for potential implementation.

B-19 At TOCDF, TEMP-2302-DFS eliminated dual-element thermocouples from the four operating furnaces (2 LICs, DFS, and MPF) because the spare element was typically failed or near the point of failure when the primary element failed. Thus, the spare provided little or no benefit. Follow-on site design documentation currently shows the dual-element thermocouples, however, it is anticipated that they will be replaced. At UMCDF, this change is being implemented for LIC 1 and LIC 2 by ECPs UMSF789LIC and UMSF767LIC, respectively. Similar ECPs are expected to be prepared for ANCDF and PBCDF.

B-20 The TOCDF RCRA requirements defined in ECP TEMP1346LIC (R1) were implemented at the follow-on sites by ECPs ANAC0331SRL, PBAC335SRL, and UMAC0149SRL. However the ANCDF implementation for 13-TISHH-713 was different than PBCDF and UMCDF. ANCDF does not currently have an Advisor indication for ETL, where PBCDF and UMCDF do. As a result of September 2000 ANCDF LIC system review meetings, the DSIC will be adding an Advisor indication for the ETL. In addition, ANCDF and UMCDF will not be using the ETL as a RCRA AWFCO. The PBCDF RCRA permit lists the ETL as an AWFCO.

B-21 At TOCDF, TEMP-2502-LIC removed the zone 3 temperature interlock to open the SRS slide gate because slag flows at a lower temperature than the interlock temperature. This interlock is in the code for ANCDF. Under the same ECP, an emergency bypass was added to allow the SRS slide gate to be manually closed (bypass of close interlock), even if the hammer drill is not fully retracted (i.e., home switch made). TOCDF found that the hammer drill can be clear of the SRS slide gate, but not back far enough to make the home switch. The bypass option allows the operator to override the close interlock after visually verifying that the hammer drill is clear of the gate. This ECP was presented at a PLL ECP review meeting in January 2000, and is under consideration by the follow-on sites.

B-22 Notes on the ANCDF, PBCDF, and UMCDF LIC P&IDs specify, "If primary chamber pressure is less than or equal to –18" wc for more than 3 seconds, PALL-052 [706] will shutdown stage "B" of exhaust blower." At the ANCDF LIC System Review Working Group in September 2000, ANCDF decided to remove the shutdown response for the alarm, which matches the TOCDF configuration. PALL-706 at ANCDF is alarm only. At TOCDF, TEMP-2591-LIC and TEMP-2592-LIC were issued to add wide range pressure transmitters, PIT-052A [706A], in parallel with PIT-052 [706] to alert the operator when the primary chamber pressure is beyond the range of PIT-052 [706]. PIT-052A [706A] range will be –20 in wc to –40 in wc. An excessive-negative-pressure alarm will be provided at –30 in wc that must be acknowledged by a CON supervisor and reset by a controls engineer. These ECPs were presented at a PLL ECP review meeting in November 2000, and are under consideration by the follow-on sites.

APPENDIX C

Alarm and Interlock Matrices

Appendix C contains *site-specific* alarm and interlock (A&I) matrices for *all four sites*. A&I matrices depict in a consolidated format the software and hardware alarms and interlocks for the equipment and instrumentation in a specific system. *For all sites except TOCDF, all LIC alarms and interlocks are presented in a single matrix*[1]. The TOCDF alarms and interlocks are presented in *four* matrices: one for the furnace instrumentation; *two* for the LIC slag removal system (SRS) material handling instrumentation; and one for LIC SRS hammerdrill and temperature control instrumentation.

Specific guidelines were developed during development of utility system FAWBs for ANCDF and UMCDF that *are* followed in the programmatic FAWBs. *Fourteen* specific guidelines have been established that define the format and content of entries in the A&I matrices:

1. Analog signals from transmitters (e.g., LITs) are not listed; the alarms are indicated separately.
2. All software prealarms and alarms (e.g., LAHs) that are indicated in the CON are listed. Setpoints and actions are shown where applicable.
3. Equipment and instrument status indication signals (e.g., open/close, on/off) are not listed unless they initiate action.
4. Alarms generated from GFE package units that report to the PLC are listed. If not already available and listed, the GFE internal alarms and actions will be added to the matrix when available from the site systems contractor and "*SC to provide detail*" will be entered into the "remarks" column.
5. For field switch generated alarms, the switch tag is listed, not the alarm tag. For example, a low-low pressure alarm (PALL) generated by the field switch, 13-PSLL-008, is listed as 13-PSLL-008 rather than 13-PALL-008. The purpose for this listing is to distinguish between field switch generated hardwired alarms and alarms generated in the software based on the analog output from a transmitter.
6. Instruments that initiate actions are listed in a vertical column sorted by prefix, loop number, instrument ID, then suffix. For example, for 99-TSH-100A, the

[1] *SRS flow and temperature alarms are not listed in the follow-on A&I matrices. These alarms have not been included because follow-on site designs have not been updated to reflect the expected operational configuration. Direction from PMCD has been that the follow-on site hardware configuration for SRS equipment and instrumentation will be modified to match the TOCDF configuration. The flow and temperature SRS alarms will be added to the A&I matrices when the site systems contractors have established the SRS configuration.*

prefix is 99, the loop number is 100, the instrument ID is TSH, and the suffix is A). Actions are listed in column across the top of the matrix and include prealarms and alarms.

7. Setpoints are listed for all instruments where applicable. Instrument ranges for analog transmitters are shown in Appendix F. Unless otherwise noted, tank level setpoints are shown from the level transmitter tap.

8. Only hand switches (e.g., push buttons) that cause system shutdowns are listed; other software and hardwired hand switches are not listed.

9. Local alarms are not listed.

10. Matrices are grouped by subsystem as applicable within each FAWB. For example, separate matrices are provided in the RHS FAWB for the rocket input feed assembly, the rocket drain station of the RSM, and the rocket shear station of the RSM.

11. Alarms associated with automatic actions are classified as *"alarms"* and alarms without automatic actions are classified as *"prealarms."*

12. Instruments listed in the matrix that are RCRA reportable are designated as such by entering *"RCRA"* in the remarks column.

13. Clarifications are provided when necessary in the remarks column of the A&I matrices, or in the system and/or operator response column in alarm and system response tables.

14. Device malfunction alarms are not shown unless they initiate automatic actions such as equipment switchovers (e.g., to a standby pump), system shutdowns, or a stop feed signal. In addition, inputs to malfunction alarms, such as conveyor zero-speed switches, are not listed unless they initiate actions other than shutting down the associated device.

ANCDF LIQUID INCINERATOR (LIC) SYSTEM

ANCDF LIC — ALARM AND INTERLOCK MATRIX — **ANCDF LIC**

P&IDs: AN-1-D-546, -547/1, -547/2, -581, -582 and AN-16-D-13; PLC: ICS-CONR-114; INTERLOCK: I-22

F00 - SPARE
F01 - SPARE
F02 - SPARE
F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
F13 - CLOSE DECON/PRW VALVE
F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - S/D LIC PURGE FUEL OIL PUMP — CH 2
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LIQUOR PMP ON
P07 - SPARE — CH 4
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM
ALERT — CH 2

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX
1	13 XS 500A/B	LIC-CNVX-201 ROPE SWITCH	activated																																S/D LIC-CNVX-201 on time delay.	2620/00	NA
2	13 SSL 502	LIC-CNVX-201 SPEED LOW	zero speed	X																															S/D LIC-CNVX-201 on time delay.	2660/11	NA
3	13 SSL 507	LIC-CNVX-202 SPEED LOW	zero speed	X																															S/D LIC-CNVX-202 on time delay.	2662/11	NA
4	13 XS 511	LIC-CNVX-203 ROPE SWITCH	activated																																S/D LIC-CNVX-203 on time delay.	2620/02	NA
5	13 SSL 513	LIC-CNVX-203 SPEED LOW	zero speed	X																															S/D LIC-CNVX-203 on time delay.	2665/11	NA
6	13 XS 516	LIC-CNVX-204 ROPE SWITCH	activated																																S/D LIC-CNVX-204 on time delay.	2620/04	NA
7	13 SSL 518	LIC-CNVX-204 SPEED LOW	zero speed	X																															S/D LIC-CNVX-204 on time delay.	2667/11	NA
8	13 XS 521	LIC-CNVX-205 ROPE SWITCH	activated																																S/D LIC-CNVX-205 on time delay.	2620/06	NA
9	13 SSL 523	LIC-CNVX-205 SPEED LOW	zero speed	X																															S/D LIC-CNVX-205 on time delay.	2668/11	NA
10	13 SSL 524	LIC-CNVX-206A SPEED LOW	zero speed	X																															S/D LIC-CNVX-206A on time delay.	2671/11	NA
11	13 SSL 525	LIC-CNVX-206B SPEED LOW	zero speed	X																															S/D LIC-CNVX-206B on time delay.	2669/11	NA
12	13 SSL 526	LIC-CNVX-206C SPEED LOW	zero speed	X																															S/D LIC-CNVX-206C on time delay.	2672/11	NA
13	13 XS 527A/B	LIC-CNVX-206A ROPE SWITCH	activated																																S/D LIC-CNVX-206A on time delay.	2620/10	NA
14	13 XS 535A/B	LIC-CNVX-207 ROPE SWITCH	activated																																S/D LIC-CNVX-207 on time delay.	2620/12	NA
15	13 SSL 537	LIC-CNVX-207 SPEED LOW	zero speed	X																															S/D LIC-CNVX-207 on time delay.	2674/11	NA
16	13 SSL 540	LIC-CNVX-208 SPEED LOW	zero speed	X																															S/D LIC-CNVX-208 on time delay.	2675/11	NA
17	13 SSL 543	LIC-CNVX-209 SPEED LOW	zero speed	X																															S/D LIC-CNVX-209 on time delay.	2676/11	NA
18	13 SSL 549	LIC-CNVX-210 SPEED LOW	zero speed	X																															S/D LIC-CNVX-210 on time delay.	2677/11	NA
19	13 ZS 567B	SLIDE GATE NOT CLOSED	Not Closed																																	2620/14	236
20	13 PAH 706	PRIM CHMBR DRAFT	-0.5 in. wc.																															X	10 sec delay.	1052/00	NA
21	13 PAL 706	PRIM CHMBR DRAFT	-10 in. wc.																															X		1052/10	NA
22	13 PALL 706	PRIM CHMBR DRAFT	-18 in. wc.																															X	3 sec delay. Alarm response to be deleted per Sept 2000 AN LIC review mtg (see FAWB Note B-22).	1052/12	254
23	13 PSLL 708	LIC-PUMP-104 DISCH PRESS	50 psig									X																								Hardwired S/D of LIC purge fuel oil pump (LIC-PUMP-104) and close purge fuel oil block valves thru FSSS.	TBD	TBD
24	13 TAHH 710	PRIM CHMBR EXHAUST GAS	**2750°F**				X	X				X																								RCRA AWFCO LIC 01. See NOTE 3. Ref: ANAP449SRL.	1052/14	238
25	13 TSLL 710	PRIM CHMBR EXH GAS	**2475°F**				X	X				X																								RCRA AWFCO LIC 02. See NOTE 3. Vendor SP was 2500 F (ANAP411SRL-R1). WA to recalibrate.	1022/00	42
26	13 TSLLL 710	PRIM CHMBR EXH GAS	1400°F																																	Ref: ANAP449SRL. Note: TOCDF setpoint 2000 F.	NA	NA

CH 4

ANCDF LIQUID INCINERATOR (LIC) SYSTEM

ANCDF LIC — ALARM AND INTERLOCK MATRIX — **ANCDF LIC**

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F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
F13 - CLOSE DECON/PRW VALVE
F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - S/D LIC PURGE FUEL OIL PUMP — CH 2
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LIQUOR PMP ON
P07 - SPARE — CH 4
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM
ALERT — CH 2

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX	
27	13 TAL 711	SEC CHMBR EXHAUST GAS	1950°F				X																													TEMP-2332-LIC deleted this alarm at TOCDF. The DSIC prepared ANAC1038SRL (awaiting approval) to delete it at ANCDF.	1051/14	NA	
28	13 TSLLL 711	SEC CHMBR EXHAUST GAS	1400°F																																	Purge bypass permissive - STATUS ONLY	NA	NA	
29	13 TISHH 712	PRIM CHMBR REFRACTRY-ETL	2900°F			X	X					X	X																							Hardwired.	1022/12	NA	
30	13 TSLL 712	PRIM CHMBR REFRACTORY	1400°F																																	Purge bypass permissive - STATUS ONLY	NA	NA	
31	13 TSLLL 712	PRIM CHMBR REFRACTORY	2.93 mA			X	X					X	X																							Hardwired. Activates the same alarm as 13-TISHH-712. Fail safe in case 4-20 mA circuit opens.	1022/12	NA	
32	13 TISHH 713	SEC CHMBR REFRACTRY-ETL	2200°F			X	X					X	X	X																						Hardwired. See FAWB Note B-20.	1022/16	NA	
33	13 TSLL 713	SEC CHMBR REFRACTORY	1400°F																																	Purge bypass permissive - STATUS ONLY	NA	NA	
34	13 TSLLL 713	SEC CHMBR REFRACTORY	2.93 mA			X	X					X	X	X																						Hardwired. Activates the same alarm as 13-TISHH-713. Fail safe in case 4-20 mA circuit opens.	1022/16	NA	
35	13 TAL 715	SEC CHMBR EXHAUST GAS	1900°F																															X			1051/16	NA	
36	13 FAL 720	PRIM CHMBR F.O. PURGE	**0.79 gpm**																															X			0251/14	NA	CH 2
37	13 FAHH 731C	PRIM CHMBR AGENT FEED (2-MIN AVG)	**37 lb/2 min**			X	X					X																								RCRA AWFCO LIC 14. See NOTE 3.	0251/06	234	CH 4
38	13 FAHH 731D	PRIM CHMBR AGENT FEED (1-HR AVG)	**1100 lb/hr**			X	X					X																								RCRA AWFCO LIC 15. See NOTE 3.	0252/04	TBD	CH 4
39	13 FAL 731	PRIM CHMBR AGENT FEED	SP*90%																															X			SP=setpoint entered in controller by operator.	0250/12	NA	
40	13 FDAH 731	PRIM CHMBR AGENT FLOW DP	>5% DP			X																															5 sec delay. Enabled when flowrate > 50 lb/hr. Ramp down @ 300 lbs/hr/min.	0221/00	NA	
41	13 FQI 731	RESET TOTALIZERS	RESET																																		Automatic reset at midnight.	0221/16	NA	
42	13 FQI 731A	AGENT TOTAL COMM ERROR	ERROR																																		Communication error between basic module and totalizer.	0221/04	NA	
43	13 FQI 731B	AGENT TOTAL COMM ERROR	ERROR																																		Communication error between basic module and totalizer.	0221/02	NA	
44	13 PAL 732	PRIM CHMBR AGENT FEED	75 psig																																		20 sec delay after pump S/U. Switch to spare agent pump. DICO to ICS-CONR-106.	0250/00	NA	
45	13 PSLLL 733	PRIM CHMBR AGENT FEED	50 psig			X									X																						10 sec delay. Ref: ANAP411SRL-R1. 60 sec delay after pump S/U. Stop agent feed to be added by ANAC1038SRL (awaiting approval)	0220/12	124	
46	13 PAL 736	PRIM CHMBR ATOMIZNG AIR	65 psig																															X			Alarm activre only if 13-XV-735B is open. SP and response per Sept 2000 AN LIC mtg and ANAC1038SRL (awaiting approval).	0250/02	NA	

ANCDF LIQUID INCINERATOR (LIC) SYSTEM

ANCDF LIC — ALARM AND INTERLOCK MATRIX — **ANCDF LIC**

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F00 - SPARE
F01 - SPARE
F02 - SPARE
F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
F13 - CLOSE DECON/PRW VALVE
F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - S/D LIC PURGE FUEL OIL PUMP — CH 2
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LIQUOR PMP ON
P07 - SPARE — CH 4
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM
ALERT — CH 2

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	B8:011/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX
47	13 PSLL 737A	PRIM CHMBR ATOM AIR HARD	40 psig	X X X		BMS permissive for agent feed and fuel oil purge. Ref: ANAP410LIC-R1.	0220/14	28
48	13 PSLL 737B	PRIM CHMBR ATOMZING AIR	1.5 psig	X X X X		Ref: ANAP410LIC-R1. Lockout (3-P running I-lock).	0220/16	28
49	13 PSLL 737C	PRIM CHMBR ATOMZING AIR	55 psig	X X X		RCRA AWFCO LIC 11. SP from vendor (ANAP410LIC-R1) and Sept 2000 AN LIC review mtg. See FAWB Note B-17.	0221/10	28
50	13 PAL 738	SEC COMB AIR DISCHARGE	35 in. wc.		X	SP per Sept 2000 AN LIC mtg.	0450/04	NA
51	13 PSLL 741	PRIM COMB AIR DISCHARGE	35 in. wc.	X		4 sec delay; Hardwired. Ref: ANAP411SRL-R1.	0220/06	NA
52	13 PAL 742	PRIM COMB AIR DISCHARGE	40 in. wc.		X	SP per Sept 2000 AN LIC mtg. Ref. ECP ANAP410LIC-R1.	0250/04	NA
53	13 FAL 743	PRIM CHMBR COMB. AIR	**(SP-100)°F**		X	Active in excess air mode. Added to TE by TEMP-2050-LIC. Alarm to be added by ANAC1038SRL (awaiting approval). SP from TE is subject to change.	0252/00	NA — CH 2
54	13 FALL 743	PRIM CHMBR COMB. AIR	**1900 cfm**	X X X		Active in excess air mode. See REMARK for 13-FAL-743.	0252/02	260 — CH 2
55	13 FFAH 743	PRIM CHMBR COMB. AIR	300% EX AIR		X	Used during ramp-up and ramp-down only	0250/10	NA — CH 2
56	13 FFAL 743	PRIM CHMBR COMB. AIR	**5% EX AIR**		X	Used during ramp-up and ramp-down only	0250/06	NA — CH 2
57	13 PAH 745	PRIM CHMBR FUEL GAS	5.0 psig		X	SP per Sept 2000 AN LIC review mtg. WA to re-range PIT-745 high-end to 5.4 psig.	0250/16	NA
58	13 PAL 745	PRIM CHMBR FUEL GAS	3.5 psig		X	SP per 11-1-99 teleconference.	0250/14	NA
59	13 PSLL 746	PRIM CHAMBER FUEL GAS	3.0 psig	X		LOCKOUT. Ref: ANAP411SRL-R1.	0220/00	NA
60	13 PAH 746B	PRIM CHMBR PILOT FUEL	3.0 psig		X	Active only during pilot trial for ignition. SP per Sept 2000 AN LIC review mtg.	0251/00	NA
61	13 PSHH 748	PRIM CHAMBER FUEL GAS	0.85 psig	X		LOCKOUT. Ref: ANAP411SRL-R1.	0220/02	NA
62	13 TAH 752	PRIM CHMBR EXHAUST GAS	(SP+100)°F		X	SP=setpoint entered in controller by operator.	1050/10	NA
63	13 TAL 752	PRIM CHMBR EXHAUST GAS	(SP-100)°F		X	SP=setpoint entered in controller by operator.	1050/06	NA
64	13 TAH 754	PRIM CHMBR REF TEMP CNTL	(SP+100)°F		X	SP=setpoint entered in controller by operator	1051/00	NA
65	13 TAL 754	PRIM CHMBR REF TEMP CNTL	(SP-100)°F		X	SP=setpoint entered in controller by operator	1050/16	NA
66	13 PSLL 760	PRIM CHMBR AGENT FEED	5 psig	X X X		RCRA AWFCO. 20 sec delay after pump S/U. SP per Sept 2000 AN LIC mtg. Vendor-supplied SP was 55 psig.	0220/10	26

ANCDF LIQUID INCINERATOR (LIC) SYSTEM

ANCDF LIC — ALARM AND INTERLOCK MATRIX — **ANCDF LIC**

P&IDs: AN-1-D-546, -547/1, -547/2, -581, -582 and AN-16-D-13; PLC: ICS-CONR-114; INTERLOCK: I-22

F00 - SPARE
F01 - SPARE
F02 - SPARE
F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
F13 - CLOSE DECON/PRW VALVE
F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - S/D LIC PURGE FUEL OIL PUMP — CH 2
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LIQUOR PMP ON
P07 - SPARE — CH 4
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM
ALERT — CH 2

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	B8:011/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX	
67	13 PAL 761	PRIM CHMBR AGENT FEED	7 psig		X	Enabled when agent feed rate > 500 lb/hr.	0251/12	NA	
68	13 PALL 761	PRIM CHMBR AGENT FEED	5 psig	X		10s delay after pump S/U. Enabled when agent feed rate > 500 lb/hr.	0251/10	232	
69	13 XY 761A	PRIM CHMBR AGENT VLV A	MALF	X			0263/11	126	
70	13 XY 761B	PRIM CHMBR AGENT VLV B	MALF	X			0270/11	130	
71	13 FAH 763	SEC CHMBR SPENT DECON	1800 lb/hr		X	SP is for full-rate processing. Inhibit fuel oil purge response deleted per Sept 2000 AN LIC review mtg.	1052/06	216	
72	13 FAHH 763	SEC CHMBR SPENT DECON	**SEE REMARKS**	X X 07		RCRA AWFCO LIC 16. **Setpoints: 1650 lb/hr when processing agent, 2000 lb/hr when not processing agent.** See Note 1.	**1051/00**	TBD	CH 4
73	13 FAL 763	SEC CHMBR SPENT DECON	1000 lb/hr	X		4 sec delay. Feed-based responses per Sept 2000 AN LIC review mtg.	1051/06	TBD	
74		SEC CHMBR WATER	225 lb/hr		X			NA	
75	13 FALL 763	SEC CHMBR SPENT DECON/WTR	110 lb/hr	X		10 sec delay. 13-FALL-763 activates the same alarm as 13-FSLL-808, see FAWB Note B-15.	NA	NA	
76	13 PSL 765	SEC CHMBR SPENT DECON/WTR	25 psig	05		Hardwired. SP per Sept 2000 AN LIC review mtg. Vendor SP is 45 psig. WA to recalibrate switch.	1022/02	NA	
77	13 XY 766	SEC CHMBR SPENT DECON/WTR	MALF	X X X		Stop agent feed' being added per Sept 2000 ANCDF LIC review mtg.	1061/11	132	
78	13 PSHH 774	SEC CHMBR PILOT GAS	2.75 psig			2 sec delay.	0421/02	NA	
79	13 TAH 779	SEC CHMBR REF TEMP CNTL	2100°F		X		1051/04	NA	
80	13 TAH 781	SEC CHMBR GAS TEMP CNTL	(SP+100)°F		X	SP=setpoint entered in controller by operator	1050/14	NA	
81	13 TAL 781	SEC CHMBR GAS TEMP CNTL	(SP-100)°F		X	SP=setpoint entered in controller by operator	1050/12	NA	
82	13 TAHH 782	SEC CHMBR EXHAUST GAS	2150°F	X X 07		RCRA AWFCO LIC 03. See NOTE 3.	1052/16	240	
83	13 TAL 782	SEC CHMBR VENTURI EXH	1900°F		X		1051/12	NA	
84	13 TSLL 782	SEC CHMBR VENTURI EXH	1850°F	X X 07		RCRA AWFCO LIC 04. See NOTE 3. Hardwired shutdown of decon feed (i.e., switch to water).	1021/00	32	
85	13 TSLLL 782	SEC CHMBR VENTURI EXH	1500°F	X X 07 04		Hardwired open permissive for agent block valves, agent flow control valve, and fuel oil purge block valves.	1020/16	134	
86	13 FFAH 788	SEC CHMBR COMB AIR	300% EX AIR		**X**	Used during ramp-up and ramp-down only	0450/12	NA	CH 2
87	13 FFAL 788	SEC CHMBR COMB AIR	**5% EX AIR**		X	Used during ramp-up and ramp-down only	0450/10	NA	CH 2
88	13 PAH 790	SEC CHMBR FUEL GAS	3.5 psig		X	SP per Sept 2000 AN LIC review mtg.	0450/02	NA	

ANCDF LIQUID INCINERATOR (LIC) SYSTEM

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F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
F13 - CLOSE DECON/PRW VALVE
F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - S/D LIC PURGE FUEL OIL PUMP — CH 2
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LIQUOR PMP ON
P07 - SPARE — CH 4
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM
ALERT — CH 2

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX	
89	13 PAL 790	SEC CHMBR FUEL GAS	2.5 psig																																X	SP per Sept 2000 AN LIC review mtg.	0450/00	NA	
90	13 PSLL 791	SEC CHMBR FUEL GAS	2.0 psig											X																						Hardwired. Ref: ANAP411SRL-R1.	0420/04	NA	
91	13 PSHH 793	SEC CHMBR FUEL GAS	**2.6 psig**											X																						Hardwired. Ref: ANAP411SRL-R1.	0420/06	NA	CH 2
92	13 PAH 794	SEC CHMBR PILOT GAS	2.6 psig																																X	SP per Sept 2000 AN LIC review mtg.	0450/06	NA	
93	13 PSLL 795	SEC COMB AIR DISCHARGE	30 in. wc.											X																						Lockout. Ref. ANAP410LIC-R1.	0420/10	NA	
94	13 FSLL 808	SEC CHMBR DECON/WATER	110 lb/hr		X																															10 sec delay. 13-FSLL-808 activates the same alarm as 13-FALL-763. See FAWB Note B-15.	1022/06	38	
95	13 PSL 809	DECON/WATER ATOMIZING AIR	65 psig			X	X					X		X																						RCRA AWFCO LIC 12. Hardwired. SP from vendor (ANAP411SRL.-R1) and Sept 2000 AN LIC review mtg.	1022/04	218	
96	13 PSHH 845	PRIM CHMBR CHAMBER	-0.25 in. wc.			X	X					X																								RCRA AWFCO LIC 05. 10 sec delay. SP based on Sept 2000 AN LIC review mtg.	1021/16	136	
97	13 AISH 850	GAS LEAK PRIM CHMBR RM	25% LEL			X	X					X																								3 sec delay. Stop feed not shown on P&ID (see FAWB Note B-8). Being added per RFI S-ALL-0239.	0220/04	20	
98	13 AISH 853	GAS LEAK SEC CHMBR RM	25% LEL			X	X					X																								2 sec delay. Stop feed not shown on P&ID (see FAWB Note B-8). Being added per RFI S-ALL-0239.	0420/14	40	
99	13 PDAH 855	SEC CHMBR EXHAUST GAS	0.7 in. wc.			X	X					X																								RCRA AWFCO LIC 07. See NOTE 3.	1052/02	56	
100	13 PSHH 882	PRIM CHMBR PILOT GAS	4.0 psig																																	2 sec delay. Ref: ANAP411SRL-R1 for setpoint.	0221/06	NA	
101	13 PSHH 896	SEC CHMBR CHAMBER	-0.25 in. wc.			X	X					X																								RCRA AWFCO LIC 06. 10 sec delay. SP from Sept 2000 AN LIC review mtg.	1022/10	TBD	
102	13 BSLL 908	PRIM CHMBR BMS SYSTEM	LOCKOUT	X		X	X					X																									1023/04	48	
103	13 BSLL 913	SEC CHMBR BMS SYSTEM	LOCKOUT		X	X	X					X																									1023/02	50	
104	13 XS 926	BURNER MANAG LOCAL E-STOP	E-STOP	X	X	X	X					X																									1023/10	60	
105	13 PURG L2	PRIM CHMBR F.O. PURGE	Complete																																		0221/12	NA	
106	28 LAHH 702	OIL-TANK-101 LEVEL HIGH-HIGH	**3404 gal**																																	**90% of 3782 gal capacity, ECP-1125.**	**3450/00**	**NA**	CH 5
107	28 LALL 702	OIL-TANK-101 LEVEL LOW-LOW	**1800 gal**																																	**ECP-1125**	**3450/02**	**NA**	CH 5
108	28 LSL 702	OIL-TANK-101 LEVEL LOW	**1940 gal**									X																								Hardwired S/D of LIC-PUMP-104. Inhibit fuel oil purge response added per Sept 2000 AN LIC review mtg. **ECP-1125 and LCO No.6**	**3420/00**	**84**	CH 5
109	71 XS 12	EMERGENCY S/D AT CONS-110	E-STOP	X	X	X	X	X	X	X	X	X			X								**X**		X				X	X					1020/00	58	CH 2/4
110	71 XS 32	EMERGENCY S/D AT CONS-112	E-STOP	X	X	X	X	X	X	X	X	X			X								**X**		X				X	X					1020/02	58	CH 2/4

ANCDF LIQUID INCINERATOR (LIC) SYSTEM

ANCDF LIC — ALARM AND INTERLOCK MATRIX — **ANCDF LIC**

P&IDs: AN-1-D-546, -547/1, -547/2, -581, -582 and AN-16-D-13; PLC: ICS-CONR-114; INTERLOCK: I-22

F00 - SPARE	**P17 - SPARE**
F01 - SPARE	**P16 - SPARE**
F02 - SPARE	**P15 - SPARE**
F03 - SPARE	**P14 - S/D LIC PURGE FUEL OIL PUMP**
F04 - S/D AGENT PUMPS	**P13 - OPEN QUENCH EMERG. PRW**
F05 - LOCKOUT - SECONDARY BURNER	**P12 - S/D WATER RETURN PMP**
F06 - LOCKOUT - PRIMARY BURNER	**P11 - BKUP BRINE PMP ON**
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE	**P10 - BKUP CLEAN LIQUOR PMP ON**
F10 - S/D SEC COMB AIR BLOWER	**P07 - SPARE**
F11 - S/D PRI COMB AIR BLOWER	**P06 - S/D BRINE PUMPS**
F12 - S/D SDS PUMPS	**P05 - S/D CLEAN LIQUOR PUMPS**
F13 - CLOSE DECON/PRW VALVE	**P04 - S/D 1ST & 2ND STAGE ID FAN**
F14 - STOP DECON FEED/SWITCH TO PRW	**P03 - SPARE**
F15 - STOP AGENT FEED	**P02 - SPARE**
F16 - S/D SEC BURNER	**P01 - S/D 1ST STAGE ID FAN**
F17 - S/D PRI BURNER	**P00 - S/D 2ND STAGE ID FAN**
MALFUNCTION	**PREALARM**
	ALERT

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX
111	71 XS 52	EMERGENCY S/D AT CONS-111	E-STOP	X	X	X	X	X	X	X	X				X								X		X					X	X						1020/04	58
112	71 XS 72	EMERGENCY S/D AT CONS-115	E-STOP	X	X	X	X	X	X	X	X				X								X		X					X	X						1020/06	58
113	71 XS 92	EMERGENCY S/D AT CONS-116	E-STOP	X	X	X	X	X	X	X	X				X								X		X					X	X						1020/10	58
114	71 XS 142B	EMERGENCY S/D AT CONS-108	E-STOP	X	X	X	X	X	X	X	X				X								X		X					X	X					Added per ANAC492INS-R1.	1023/00	58
115		BRA TANKS LVL HI-HI / UNAVAILABLE	DICO				X	X				X																								RCRA AWFCO LIC 24. See BRA FAWB for tag #s and setpoints.	B4:23/01	210
116		LIC PAS/PFS NORMAL	NOT NORMAL																																	F07, F14, and F15 interlocks deleted per Sept 2000 AN LIC review mtg.	B601/00	252

NOTE 1: At the Sept 2000 ANCDF LIC review meeting, ANCDF stated that they will not have CEMS monitoring at the LIC primary chamber exhaust. Therefore, the CEMS alarms currently shown on AN-1-D-546 are not listed in this A&I matrix. The CEMS revised configuration will be implemented by ANAP1019 and ANAC1038 under Change Case 172 R1. Refer to PAS/PFS programmatic process FAWB, Book 28 for ANCDF LIC CEMS alarms.

NOTE 2: **DELETED.**

NOTE 3: AWFCO alarm setpoints reflect the proposed normal operational setpoints submitted to ADEM for STB.

NOTE 4: **DELETED.**

PBCDF LIQUID INCINERATOR (LIC) SYSTEM

PBCDF LIC — ALARM AND INTERLOCK MATRIX — **PBCDF LIC**

P&IDs: PB-1-D-525, -526, -527, -571, -572 and PB-16-D-13
PLC: ICS-CONR-114; INTERLOCK: I-7

F00 - SPARE
F01 - SPARE
F02 - SPARE
F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
F13 - CLOSE DECON/PRW VALVE
F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LIQUOR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX
1	13 PSLL 008	PRIM CHAMBER FUEL GAS	3.0 psig										X																							LOCKOUT. Ref: PBAP371SRL-R1.	0220/00	NA
2	13 PSHH 009	PRIM CHAMBER FUEL GAS	0.85 psig										X																							LOCKOUT. Ref: PBAP371SRL-R1.	0220/02	NA
3	13 PAH 032	SEC CHMBR FUEL GAS	3.5 psig																																X	Setpoint per 11-1-99 teleconference.	0450/02	NA
4	13 PAL 032	SEC CHMBR FUEL GAS	2.5 psig																																X	Setpoint per 11-1-99 teleconference.	0450/00	NA
5	13 AISH 035	GAS LEAK	PRIM CHMBR RM	25% LEL			X	X				X																							3 sec delay. Stop feed not shown on P&ID (see FAWB Note B-8). Being added per RFI S-ALL-0239.	0220/04	20
6	13 FAL 042	PRIM CHMBR	COMB. AIR	2400 cfm																															X	Active in excess air mode. Added to TE by TEMP-2050-LIC. Alarm not shown on PB-1-D-525. ANCDF adding alarm by ANAC1038SRL (awaiting approval). SP from TE is subject to change.	0252/00	NA
7	13 FALL 042	PRIM CHMBR	COMB. AIR	2300 cfm			X	X				X																							Active in excess air mode. See REMARK for 13-FAL-042.	0252/02	260
8	13 FFAH 042	PRIM CHMBR	COMB. AIR	300% EX AIR																															X	Used during ramp-up and ramp-down only	0250/10	NA
9	13 FFAL 042	PRIM CHMBR	COMB. AIR	15% EX AIR																															X	Used during ramp-up and ramp-down only	0250/06	NA
10	13 TAH 043	PRIM CHMBR	EXHAUST GAS	(SP+100)°F																															X	SP=setpoint entered in controller by operator.	1050/10	NA
11	13 TAL 043	PRIM CHMBR	EXHAUST GAS	(SP-100)°F																															X	SP=setpoint entered in controller by operator.	1050/06	NA
12	13 PSLL 044	PRIM COMB AIR	DISCHARGE	35 in. wc.									X																							4 sec delay; Hardwired. Ref: PBAP371SRL-R1.	0220/06	NA
13	13 FFAH 050	SEC CHMBR	COMB AIR	300% EX AIR																															X	Used during ramp-up and ramp-down only	0450/12	NA
14	13 FFAL 050	SEC CHMBR	COMB AIR	15% EX AIR																															X	Used during ramp-up and ramp-down only	0450/10	NA
15	13 PSL 051	SEC CHMBR	DECON/WATER	65 psig			X	X				X		X																						RCRA AWFCO LIC 04. Hardwired. Setpoint per RCRA permit. Vendor setpoint is 45 psig. ANCDF SP is 25 psig. SC to resolve SP discrepancy.	1022/02	TBD
16	13 PAH 052	PRIM CHMBR	DRAFT	-0.5 in. wc.																															X	10 sec delay.	1052/00	NA
17	13 PAL 052	PRIM CHMBR	DRAFT	-10 in. wc.																															X		1052/10	NA

PBCDF LIQUID INCINERATOR (LIC) SYSTEM

PBCDF LIC — ALARM AND INTERLOCK MATRIX — **PBCDF LIC**

P&IDs: PB-1-D-525, -526, -527, -571, -572 and PB-16-D-13
PLC: ICS-CONR-114; INTERLOCK: I-7

F00 - SPARE
F01 - SPARE
F02 - SPARE
F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
F13 - CLOSE DECON/PRW VALVE
F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LIQUOR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	B8:011/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX
18	13 PALL 052	PRIM CHMBR DRAFT	-18 in. wc.		X	3 sec delay. Alarm response to be deleted at ANCDF (see FAWB Note B-22).	1052/12	254
19	13 PSL 058	DECON/WATER ATOMIZING AIR	47 psig	X X X X		RCRA AWFCO LIC 14. Hardwired. SP from RCRA permit. Vendor SP is 65 psig. Ref: PBAP371SRL-R1. SC to resolve SP discrepancy.	1022/04	218
20	13 PAH 060A	PRIM CHMBR FUEL GAS	5.0 psig		X	SP per Sept 2000 AN LIC review mtg. Per DSIC, PIT range may be to only 5.1 psig.	0250/16	NA
21	13 PAL 060A	PRIM CHMBR FUEL GAS	3.5 psig		X	Setpoint per 11-1-99 teleconference.	0250/14	NA
22	13 PAH 060B	PRIM CHMBR PILOT FUEL	3.0 psig		X	Active only during pilot trial for ignition. SP per Sept 2000 AN LIC review mtg.	0251/00	NA
23	13 PAL 061	SEC COMB AIR DISCHARGE	TBD		X	SP to be based on final SP for RCRA AWFCO, 13-PSLL-200.	0450/04	NA
24	13 PSLL 073	SEC CHMBR FUEL GAS	2.0 psig	X		Hardwired. Ref: PBAP371SRL-R1.	0420/04	NA
25	13 PSHH 074	SEC CHMBR FUEL GAS	1.3 psig	X		Hardwired. Ref: PBAP371SRL-R1.	0420/06	NA
26	13 XY 099	SEC CHMBR SPENT DECON/WATER	MALF	X X		ANCDF is adding 'stop agent feed' response.	1061/11	132
27	13 FAH 102	SEC CHMBR SPENT DECON	1800 lb/hr	X		SP from AN code for full-rate processing. ANCDF deleted fuel oil purge inhibit response.	1052/06	216
28	13 FAHH 102	SEC CHMBR SPENT DECON	2000 lb/hr	X X X		RCRA AWFCO LIC 11. Hourly rolling average; 34 lb/min maximum. To be adjusted lower periodically or as necessary to metals and chlorine limitations.	1053/02	102
29	13 FAL 102	SEC CHMBR SPENT DECON/WATER	225 lb/hr		X	4 sec delay.	1051/06	NA
30	13 FALL 102	SEC CHMBR SPENT DECON/WATER	110 lb/hr	X		60 sec delay. At TOCDF, 13-FALL-102 activates the same alarm as 13-FSLL-230, see FAWB Note B-15.	NA	NA
31	13 TAH 103	SEC CHMBR GAS TEMP CNTL	(SP+100)°F		X	SP=setpoint entered in controller by operator	1050/14	NA
32	13 TAL 103	SEC CHMBR GAS TEMP CNTL	(SP-100)°F		X	SP=setpoint entered in controller by operator	1050/12	NA

PBCDF LIQUID INCINERATOR (LIC) SYSTEM

PBCDF LIC — **PBCDF LIC**

ALARM AND INTERLOCK MATRIX

P&IDs: PB-1-D-525, -526, -527, -571, -572 and PB-16-D-13
PLC: ICS-CONR-114; INTERLOCK: I-7

F00 - SPARE
F01 - SPARE
F02 - SPARE
F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
F13 - CLOSE DECON/PRW VALVE
F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LIQUOR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX
33	13 PSLL 112	PRIM CHMBR AGENT FEED	55 psig			X	X					X																								See NOTE 1. 20 sec delay after pump S/U. Setpoint per vendor data sheet which differs from RCRA permit for PALLL-112.	0220/10	26
34	13 PAL 113	PRIM CHMBR AGENT FEED	7 psig																															X	Enabled when agent feed rate > 500 lb/hr (mask value from AN).	0251/12	NA
35	13 PALL 113	PRIM CHMBR AGENT FEED	5 psig			X																													See NOTE 1. 10s delay after pump S/U. Enabled when agent feed rate > 500 lb/hr (mask value from AN).	0251/10	232
36	13 PSLLL 115	PRIM CHMBR AGENT FEED	50 psig												X																				10 sec delay. Ref: PBAP371SRL-R1. 60 sec delay after pump S/U. ANCDF adding stop agent feed response.	0220/12	124
37	13 PAL 119	PRIM CHMBR AGENT FEED	75 psig																																20 sec delay after pump S/U. Switch to spare agent pump. DICO to ICS-CONR-106.	0250/00	NA
38	13 TAH 125	PRIM CHMBR REF TEMP CNTL	(SP+100)°F																															X	SP=setpoint entered in controller by operator	1051/00	NA
39	13 TAL 125	PRIM CHMBR REF TEMP CNTL	(SP-100)°F																															X	SP=setpoint entered in controller by operator	1050/16	NA
40	13 TAH 126	SEC CHMBR REF TEMP CNTL	2100°F																															X		1051/04	NA
41	13 FAH 127	PRIM CHMBR AGENT FEED	27 lbs/2-min																															X	Setpoint based on TOCDF code, 90% of RCRA alarm for 2-min avg.	0251/04	NA
42	13 FAHH 127	PRIM CHMBR AGENT FEED	NOTE 2			X	X					X																							RCRA AWFCO LIC 10. See NOTE 2.	0251/06	234
43	13 FAHH 127C	PRIM CHMBR AGENT FEED	NOTE 2			X	X					X																							RCRA AWFCO LIC 10. See NOTE 2.	TBD	TBD
44	13 FAHH 127D	PRIM CHMBR AGENT FEED	NOTE 2			X	X					X																							RCRA AWFCO LIC 10. See NOTE 2.	TBD	TBD
45	13 FAL 127	PRIM CHMBR AGENT FEED	SP*90%																															X	SP=setpoint entered in controller by operator.	0250/12	NA
46	13 FDAH 127	PRIM CHMBR AGENT FLOW DP	>5% DP			X																													5 sec delay. Enabled when flowrate > 50 lb/hr. Ramp down @ 300 lbs/hr/min.	0221/00	NA
47	13 FQI 127	RESET	TOTALIZERS	RESET																															Automatic reset at midnight.	0221/16	NA
48	13 FQI 127A	AGENT TOTAL	COMM ERROR	ERROR																															Communication error between basic module and totalizer.	0221/04	NA
49	13 FQI 127B	AGENT TOTAL	COMM ERROR	ERROR																															Communication error between basic module and totalizer.	0221/02	NA

PBCDF LIQUID INCINERATOR (LIC) SYSTEM

PBCDF LIC — ALARM AND INTERLOCK MATRIX — **PBCDF LIC**

P&IDs: PB-1-D-525, -526, -527, -571, -572 and PB-16-D-13
PLC: ICS-CONR-114; INTERLOCK: I-7

F00 - SPARE
F01 - SPARE
F02 - SPARE
F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
F13 - CLOSE DECON/PRW VALVE
F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LIQUOR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX
50	13 PSLL 127A	PRIM CHMBR ATOM AIR HARD	12 psig			X	X					X																								RCRA AWFCO LIC 13. SP from RCRA permit. BMS permissive for agent feed and fuel oil purge. Vendor SP is 40 psig. Ref: PBAP369LIC-R1. SC to resolve SP discrepancy.	0220/14	28
51	13 PSLL 127B	PRIM CHMBR ATOMZING AIR	12 psig			X	X					X	X																							RCRA AWFCO LIC 13. SP from RCRA permit. Vendor SP is 1.5 psig. Ref: PBAP369LIC-R1. Lockout (3-P running I-lock). SC to resolve SP discrepancy.	0220/16	28
52	13 PSLL 127C	PRIM CHMBR ATOMZING AIR	55 psig			X	X					X																								SP per vendor. Ref: PBAP369LIC-R1.	0221/10	28
53	13 PAL 128	PRIM CHMBR ATOMIZNG AIR	65 psig																																X	SP and response per DSIC recommendation at Sept 2000 ANCDF LIC meeting. DSIC also recommends that the alarm be active only if 13-XV-126B is open.	0250/02	NA
54	13 TAHH 129	SEC CHMBR EXHAUST GAS	2150°F			X	X					X																								Setpoint based on similar alarm at ANCDF and UMCDF.	1052/16	240
55	13 TAL 129	SEC CHMBR VENTURI EXH	1900°F																																X		1051/12	NA
56	13 TSLL 129	SEC CHMBR VENTURI EXH	1850°F			X	X					X																								RCRA AWFCO LIC 06. Hardwired shutdown of decon feed (i.e., switch to water).	1021/00	32
57	13 TSLLL 129	SEC CHMBR VENTURI EXH	1500°F			X	X					X			X																					Hardwired open permissive for agent block valves, agent flow control valve, and fuel oil purge block valves.	1020/16	134
58	13 ASL 132	PRIM CHMBR EXHAUST O2	3% O2																																	2 sec delay. SP from TOCDF.	1021/02	NA
59	13 XS 132	PRIM CHMBR EXHAUST O2	MALF																																	See NOTE 3.	TBD	NA
60	13 XY 134A	PRIM CHMBR AGENT VLV A	MALF			X																															0263/11	126
61	13 XY 134B	PRIM CHMBR AGENT VLV B	MALF			X																															0270/11	130
62	13 PAL 150	PRIM COMB AIR DISCHARGE	40 in.wc.																																X	SP based on Sept 2000 AN LIC mtg. Ref. ECP PBAP369LIC-R1.	0250/04	NA
63	13 PSLL 200	SEC COMB AIR DISCHARGE	36 in. wc.			X	X					X		X																						RCRA AWFCO LIC 08. SP from RCRA permit. Vendor SP is 30 in.wc. (Ref: PBAP369LIC-R1). SC to resolve SP discrepancy.	0420/10	TBD

PBCDF LIQUID INCINERATOR (LIC) SYSTEM

PBCDF LIC — ALARM AND INTERLOCK MATRIX — **PBCDF LIC**

P&IDs: PB-1-D-525, -526, -527, -571, -572 and PB-16-D-13
PLC: ICS-CONR-114; INTERLOCK: I-7

F00 - SPARE
F01 - SPARE
F02 - SPARE
F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
F13 - CLOSE DECON/PRW VALVE
F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LIQUOR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX
64	13 AAH 228	PRIM CHMBR EXHAUST CO	100 ppm																																	1 hr rolling average (per min). Alarm based on TOCDF.	1050/00	NA
65	13 ASH 228	PRIM CHMBR EXHAUST CO	90 ppm																																	2 sec delay. Alarm based on TOCDF.	1021/06	NA
66	13 XS 228	PRIM CHMBR EXHAUST CO	MALF																																	See NOTE 3.	TBD	NA
67	13 FSLL 230	SEC CHMBR DECON/WATER	110 lb/hr		X																															60 sec delay. AT TOCDF, 13-FSLL-230 activates the same alarm as 13-FALL-102. See FAWB Note B-15.	1022/06	38
68	13 PSHH 233	PRIM CHMBR CHAMBER	-0.1 in. wc.			X	X				X																									RCRA AWFCO LIC 01.	1021/16	136
69	13 AISH 235	GAS LEAK SEC CHMBR RM	25% LEL			X	X				X																									2 sec delay. Stop feed not shown on P&ID (see FAWB Note B-8). Being added per RFI S-ALL-0239.	0420/14	40
70	13 XS 300A/B	LIC-CNVX-101 ROPE SWITCH	activated																																	S/D LIC-CNVX-101 on time delay.	2620/00	NA
71	13 SSL 302	LIC-CNVX-101 SPEED LOW	zero speed	X																																S/D LIC-CNVX-101 on time delay.	2660/11	NA
72	13 SSL 307	LIC-CNVX-102 SPEED LOW	zero speed	X																																S/D LIC-CNVX-102 on time delay.	2662/11	NA
73	13 XS 311	LIC-CNVX-103 ROPE SWITCH	activated																																	S/D LIC-CNVX-103 on time delay.	2620/02	NA
74	13 SSL 313	LIC-CNVX-103 SPEED LOW	zero speed	X																																S/D LIC-CNVX-103 on time delay.	2665/11	NA
75	13 XS 316	LIC-CNVX-104 ROPE SWITCH	activated																																	S/D LIC-CNVX-104 on time delay.	2620/04	NA
76	13 SSL 318	LIC-CNVX-104 SPEED LOW	zero speed	X																																S/D LIC-CNVX-104 on time delay.	2667/11	NA
77	13 XS 321	LIC-CNVX-105 ROPE SWITCH	activated																																	S/D LIC-CNVX-105 on time delay.	2620/06	NA
78	13 SSL 323	LIC-CNVX-105 SPEED LOW	zero speed	X																																S/D LIC-CNVX-105 on time delay.	2668/11	NA
79	13 SSL 324	LIC-CNVX-106A SPEED LOW	zero speed	X																																S/D LIC-CNVX-106A on time delay.	2671/11	NA
80	13 SSL 325	LIC-CNVX-106B SPEED LOW	zero speed	X																																S/D LIC-CNVX-106B on time delay.	2669/11	NA
81	13 SSL 326	LIC-CNVX-106C SPEED LOW	zero speed	X																																S/D LIC-CNVX-106C on time delay.	2672/11	NA
82	13 XS 327A/B	LIC-CNVX-106A ROPE SWITCH	activated																																	S/D LIC-CNVX-106A on time delay.	2620/10	NA
83	13 XS 335A/B	LIC-CNVX-107 ROPE SWITCH	activated																																	S/D LIC-CNVX-107 on time delay.	2620/12	NA
84	13 SSL 337	LIC-CNVX-107 SPEED LOW	zero speed	X																																S/D LIC-CNVX-107 on time delay.	2674/11	NA
85	13 SSL 340	LIC-CNVX-108 SPEED LOW	zero speed	X																																S/D LIC-CNVX-108 on time delay.	2675/11	NA
86	13 SSL 343	LIC-CNVX-109 SPEED LOW	zero speed	X																																S/D LIC-CNVX-109 on time delay.	2676/11	NA
87	13 SSL 349	LIC-CNVX-110 SPEED LOW	zero speed	X																																S/D LIC-CNVX-110 on time delay.	2677/11	NA
88	13 ZS 367A	SLIDE GATE OPEN	OPEN			X	X				X																									RCRA AWFCO LIC 32. Tag # and SP from RCRA permit. Note: AN & UM use ZS-367B 'not closed' as AWFCO. See NOTE 4.	2620/14	236
89	13 IA 382	LIC-HEAT-101 ZONE 1 PHASE	IMBALANCE																																		2820/12	NA
90	13 IA 383	LIC-HEAT-102 ZONE 2 PHASE	IMBALANCE																																		2820/14	NA
91	13 TAHH 610	PRIM CHMBR EXHAUST GAS	2850°F			X	X				X																									Setpoint from TOCDF code.	1052/14	238

PBCDF LIQUID INCINERATOR (LIC) SYSTEM

PBCDF LIC — **PBCDF LIC**

ALARM AND INTERLOCK MATRIX

P&IDs: PB-1-D-525, -526, -527, -571, -572 and PB-16-D-13
PLC: ICS-CONR-114; INTERLOCK: I-7

F00 - SPARE
F01 - SPARE
F02 - SPARE
F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
F13 - CLOSE DECON/PRW VALVE
F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LIQUOR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	B8:011/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX
92	13 TSLL 610	PRIM CHMBR EXH GAS	2550°F	X X X		RCRA AWFCO LIC 03. Setpoint from permit. Per DSIC, vendor setpoint is 2500 F Ref: PBAP371SRL-R1	1022/00	42
93	13 TSLLL 610	PRIM CHMBR EXH GAS	1400°F			Ref: PBAP395SRL. Note: TOCDF setpoint 2000 F.	NA	NA
94	13 TAL 611	SEC CHMBR EXHAUST GAS	1950°F	X		TEMP-2332-LIC deleted this alarm at TOCDF. FDLL direction was mandatory for all sites. AN will implement under ANAC1038SRL (awaiting approval).	1051/14	NA
95	13 TSLLL 611	SEC CHMBR EXHAUST GAS	1400°F			Purge bypass permissive - STATUS ONLY	NA	NA
96	13 TISHH 612	PRIM CHMBR REFRACTRY-ETL	2850°F	X X X X		LIC AWFCO LIC 02. Setpoint from RCRA permit. Hardwired.	1022/12	TBD
97	13 TSLL 612	PRIM CHMBR REFRACTORY	1400°F			Purge bypass permissive - STATUS ONLY	NA	NA
98	13 TSLLL 612	PRIM CHMBR REFRACTORY	2.93 mA	X X X X		Hardwired. Activates the same alarm as 13-TISHH-612. Fail safe in case 4-20 mA circuit opens.	1022/12	NA
99	13 TISHH 613	SEC CHMBR REFRACTRY-ETL	2150°F	X X X X		LIC AWFCO LIC 07. Setpoint from RCRA permit. Hardwired. See FAWB Note B-20.	1022/16	NA
100	13 TSLL 613	SEC CHMBR REFRACTORY	1400°F			Purge bypass permissive - STATUS ONLY	NA	NA
101	13 TSLLL 613	SEC CHMBR REFRACTORY	2.93 mA	X X X X		Hardwired. Activates the same alarm as 13-TISHH-613. Fail safe in case 4-20 mA circuit opens.	1022/16	NA
102	13 TAL 615	SEC CHMBR EXHAUST GAS	1900°F		X		1051/16	NA
103	13 PSLL 708	LIC-PUMP-104 DISCH PRESS	50 psig	X		Hardwired S/D of LIC purge fuel oil pump (LIC-PUMP-104) and close purge fuel oil block valves thru FSSS.	TBD	TBD
104	13 FAL 720	PRIM CHMBR F.O. PURGE	0.80 gpm		X		0251/14	NA
105	13 KAL 854	SEC CHMBR EXHAUST GAS	2.0 sec	X X X			1052/04	52
106	13 PDAH 854	SEC CHMBR EXHAUST GAS	0.7 in. wc.	X X X		RCRA AWFCO LIC 09.	1052/02	56
107	13 PSHH 866	SEC CHMBR PILOT GAS	2.75 psig			2 sec delay.	0421/02	NA

PBCDF LIQUID INCINERATOR (LIC) SYSTEM

PBCDF LIC — **PBCDF LIC**

ALARM AND INTERLOCK MATRIX

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PLC: ICS-CONR-114; INTERLOCK: I-7

F00 - SPARE
F01 - SPARE
F02 - SPARE
F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
F13 - CLOSE DECON/PRW VALVE
F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LIQUOR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	B8:011/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX
108	13 PAH 868	SEC CHMBR PILOT GAS	2.6 psig		X	Setpoint per 11-1-99 teleconference based on 13-PCV-889 set at 2.45 psig (Ref. PBAP371SRL-R1)	0450/06	NA
109	13 PSHH 873	PRIM CHMBR PILOT GAS	4.0 psig			2 ses delay. Ref: PBAP371SRL-R1 for setpoint.	0221/06	NA
110	13 PSHH 888	SEC CHMBR CHAMBER	-0.1 in. wc.	X X X		RCRA AWFCO LIC 28.	1022/10	TBD
111	13 BSLL 909	SEC CHMBR BMS SYSTEM	LOCKOUT	X X X		RCRA AWFCO LIC 31.	1023/02	50
112	13 BSLL 912	PRIM CHMBR BMS SYSTEM	LOCKOUT	X X X		RCRA AWFCO LIC 30.	1023/04	48
113	13 XS 925	BURNER MANAG LOCAL E-STOP	E-STOP	X X X X			1023/10	60
114	13 PURG L1	PRIM CHMBR F.O. PURGE	Complete				0221/12	NA
115	28 LAHH 702	OIL-TANK-101 LEVEL HIGH-HIGH	TBD				TBD	NA
116	28 LALL 702	OIL-TANK-101 LEVEL LOW-LOW	TBD				TBD	NA
117	28 LSL 702	OIL-TANK-101 LEVEL LOW	3200 gal			Hardwired S/D of LIC purge fuel oil pump. ANCDF added fuel oil purge inhibit response.	0222/00	NA
118	71 XS 002	EMERGENCY S/D AT CONS-110	E-STOP	X X X X X X X X X X X X			1020/00	58
119	71 XS 022	EMERGENCY S/D AT CONS-112	E-STOP	X X X X X X X X X X X X			1020/02	58
120	71 XS 042	EMERGENCY S/D AT CONS-111	E-STOP	X X X X X X X X X X X X			1020/04	58
121	71 XS 062	EMERGENCY S/D AT CONS-115	E-STOP	X X X X X X X X X X X X			1020/06	58
122	71 XS 082	EMERGENCY S/D AT CONS-116	E-STOP	X X X X X X X X X X X X			1020/10	58
123	71 XS 142A	EMERGENCY S/D AT CONS-108	E-STOP	X X X X X X X X X X X X		Added per PBAC437INS.	1023/00	58
124		BRA TANKS LVL HI-HI / UNAVAILABLE	DICO	X X X		RCRA AWFCO LIC 19. See BRA FAWB for tag #s and setpoints.	B4:23/01	210
125		LIC PAS/PFS NORMAL	NOT NORMAL	X X X		ANCDF deleted all interlocks.	B601/00	252

NOTE 1: The PBCDF RCRA permit lists AWFCO LIC 05 as 13-PALLL-112 with a 5 psig setpoint, which does not exist in the design. The RCRA alarm will be either 13-PSLL-112 or 13-PALL-113.

NOTE 2: PBCDF RCRA agent feed rate high high alarm is based on an hourly rolling average, not to exceed 2% of the hourly feed rate per minute. The setpoints during normal operation are: VX 700 lb/hr, 14 lb/min; GB 1050 lb/hr, 21 lb/min; HD 1330 lb/hr, 27 lb/min; HT 1210 lb/hr, 24 lb/min.

NOTE 3: The CEMS alarms in the A&I matrix reflect the alarms in approved RFI S-ALL-249, which documents the operation, alarm, interlock requirements, and setpoints for the CEMS non-agent monitors. These requirements were derived from the Code of Federal Regulations (40 CFR, Part 60), site RCRA and air permits, and process requirements. The EIC is using this RFI as a basis for the PBCDF PLC software code. Parsons will be preparing ECPs to implement this RFI into the PBCDF design.

NOTE 4: SRS flow and temperature alarms are not listed because there are numerous discrepancies between the PBCDF design and the expected PBCDF configuration. PMCD has directed that PBCDF PBCDF implement the final TOCDF LIC SRS configuration, however, the PBCDF design still reflects the original TOCDF configuration and has not been revised to reflect the numerous changes that TOCDF has made. The remaining SRS alarms will be added to the A&I matrix when the PBCDF SC has established the SRS configuration.

TOCDF ALARM AND INTERLOCK MATRIX

SYSTEM: LIC 1 AND LIC 2 FURNACES
AREA 13
FURNACE CONTROL

PLCs: ICS-CONR-114 (LIC 1) ICS-CONR-119 (LIC 2)
LIC 1 P&IDs: TE-1-D-526, TE-1-D-527/1
LIC 2 P&IDs: TE-1-D-546, TE-1-D-547/1

1) SHUTDOWN PRIMARY BURNER
2) SHUTDOWN SECONDARY BURNER
3) STOP AGENT FEED (SHUT VALVES & REMOVE AGENT FEED DICO CONR 106)
4) STOP DECON FEED (SWITCH TO WATER - 11-XV-102A [11-XV-762A])
5) CLOSE DECON/WATER VALVE (13-XV-099 [13-XV-766])
6) SHUTDOWN SDS PUMPS (SDS-PUMP-171,-172 (SPARE)[SDS-PUMP-271])
7) SHUTDOWN PRIMARY COMBUSTION AIR BLOWER (LIC-BLOW-101 [LIC-BLOW-201])
8) SHUTDOWN SECONDARY COMBUSTION AIR BLOWER (LIC-BLOW102 [LIC-BLOW-202])
9) SHUTDOWN ID FAN (PAS-BLOW-104 [PAS-BLOW-204])
10) PRIMARY CHAMBER BURNER - LOCKOUT
11) SECONDARY CHAMBER BURNER - LOCKOUT
12) STOP AGENT PUMP (ACS-PUMP-101,-102 (SPARE)[ACS-PUMP-201](DICO TO CONR 106)
13) STOP FUEL OIL PURGE
14) PRE-ALARM
15) ALARM

LN	LIC 1 TAG NUMBER	LIC 2 TAG NUMBER	DESCRIPTION	SETPOINT	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	REMARKS	ALARM BIT B001:XX/XX
1	13-PSLL-008	13-PSLL-746	PRIMARY CHMBR FUEL GAS	1.5 psig										X					X		0220/00
2	13-PSHH-009	13-PSHH-748	PRIMARY CHMBR FUEL GAS	4.75 psig										X					X		0220/02
3	13-PAH-032	13-PAH-790	SEC. CHAMBER FUEL GAS	3.0 psig														X			0450/02
4	13-PAL-032	13-PAL-790	SEC. CHAMBER FUEL GAS	2.25 psig														X			0450/00
5	13-AAH-035A	13-AAH-850A	FUEL GAS LEAK PRIMARY CHMBR ROOM	25% LEL			X	X									X		X	3 sec delay.	0220/04
6	13-FAL-042	13-FAL-743	PRIMARY CHMBR COMB AIR	2400 cfm														X		Enabled when in excess air mode.	0206/02
7	13-FALL-042	13-FALL-743	PRIMARY CHMBR COMB AIR	2300 cfm			X	X									X		X	Enabled when in excess air mode.	0206/04
8	13-FFAH-042	13-FFAH-743	PRIMARY CHMBR COMB AIR	300% EX. AIR														X		Used during ramp-up and ramp-down only.	0250/10
9	13-FFAL-042	13-FFAL-743	PRIMARY CHMBR COMB AIR	15% EX. AIR														X		Used during ramp-up and ramp-down only.	0250/06
10	13-TAH-043	13-TAH-752	PRIMARY CHMBR EXHAUST GAS	(SP+100)°F														X		SP=setpoint entered in controller by operator	1050/10
11	13-TAL-043	13-TAL-752	PRIMARY CHMBR EXHAUST GAS	(SP-100)°F														X		SP=setpoint entered in controller by operator	1050/06
12	13-PSLL-044	13-PSLL-741	PRIMARY CHMBR COMB AIR BLWR DISCHARGE	20 in wc										X					X	4 sec delay. Hardwired.	0220/06
13	13-FFAH-050	13-FFAH-788	SEC. CHAMBER COMB AIR	300% EX. AIR															X	Used during ramp-up and ramp-down only.	0450/12
14	13-FFAL-050	13-FFAL-788	SEC. CHAMBER COMB AIR	15% EX. AIR															X	Used during ramp-up and ramp-down only.	0450/10
15	13-PSL-051	13-PSL-765	SEC. CHAMBER DECON/WATER	45 psig											X				X	Hardwired.	1022/02
16	13-PAH-052	13-PAH-706	PRIMARY CHAMBER PRESSURE	-0.5 in wc														X		10 sec delay. Pressure relative to room pressure.	1052/00
17	13-PAL-052	13-PAL-706	PRIMARY CHAMBER PRESSURE	-10 in wc														X			1052/10
18	13-PALL-052	13-PALL-706	PRIMARY CHAMBER PRESSURE	-18 in wc															X	3 sec delay (see FAWB Note B-22).	1052/12
19	13-PSL-058	13-PSL-809	SEC. CHAMBER DECON/WATER ATOMIZING AIR	60 psig			X	X							X		X		X	RCRA.	1022/04
20	13-PAH-060A	13-PAH-745	PRIMARY CHMBR FUEL GAS	6.5 psig														X			0250/16
21	13-PAL-060A	13-PAL-745	PRIMARY CHMBR FUEL GAS	1.75 psig														X			0250/14
22	13-PAH-060B	13-PAH-746B	PRIMARY CHMBR PILOT FUEL	2.5 psig														X		Enabled only during pilot trial for ignition.	0251/00
23	13-PAL-061	13-PAL-738	SEC. CHAMBER COMB AIR BLWR DISCHARGE	25 in wc														X			0450/04
24	13-PSLL-073	13-PSLL-791	SEC. CHAMBER FUEL GAS	1.5 psig											X				X	Hardwired.	0420/04
25	13-PSHH-074	13-PSHH-793	SEC. CHAMBER FUEL GAS	3.75 psig											X				X	Hardwired.	0420/06
26	13-XY-099	13-XY-766	SEC CHMBR SPENT DECON/WATER BLK VLV MALF	MALF				X	X										X		1061/11
27	13-FAH-102	13-FAH-763	DECON/WATER FLOW	1700 lb/hr													X	X			1052/06
28	13-FAL-102	13-FAL-763	SEC CHAMBER SPENT DECON/WATER	225 lb/hr														X		4 sec delay.	1051/06
29	13-FALL-102	13-FALL-763	SEC CHAMBER SPENT DECON/WATER	110 lb/hr		X													X	60 sec delay. Note: 13-FALL-102 [763] activates the same alarm as 13-FSLL-230 [808]. See FAWB Note B-15.	1022/06
30	13-FAHH-102A	13-FAHH-763A	DECON/WATER FLOW (2 MIN ROLLING AVG)	64 lb/2-min			X	X									X		X	RCRA.	1051/02
31	13-FAHH-102B	13-FAHH-763B	DECON/WATER FLOW (10 MIN ROLLING AVG)	306 lb/10-min			X	X											X	RCRA.	1052/14
32	13-FAHH-102C	13-FAHH-763C	DECON/WATER FLOW (HOURLY ROLLING AVG)	1790 lb/hr			X	X											X	RCRA.	1052/16
33	13-TAH-103	13-TAH-781	SEC. CHAMBER EXHAUST GAS	(SP+100)°F														X			1050/14
34	13-TAL-103	13-TAL-781	SEC. CHAMBER EXHAUST GAS	(SP-100)°F														X			1050/12
35	13-PAL-112	13-PAL-760	PRIMARY CHAMBER AGENT GUN	7 psig														X		Enabled when agent feed rate > 550 lb/hr (Alarm not shown on P&ID).	0251/12
36	13-PSLL-112	13-PSLL-760	PRIMARY CHMBR AGENT PUMP DISCHARGE	20 psig			X												X	Enabled after ACS pump on for 20 sec.	0220/10
37	13-PSLLL-112	13-PSLLL-733	PRIMARY CHAMBER AGENT PUMP DISCHARGE	15 psig												X			X	Enabled after ACS pump on for 60 sec. Pump shutdown-DICO to ICS-CONR-106 after 10 sec delay.	0220/12

TOCDF ALARM AND INTERLOCK MATRIX

SYSTEM: LIC 1 AND LIC 2 FURNACES
AREA 13
FURNACE CONTROL

PLCs: ICS-CONR-114 (LIC 1) ICS-CONR-119 (LIC 2)
LIC 1 P&IDs: TE-1-D-526, TE-1-D-527/1
LIC 2 P&IDs: TE-1-D-546, TE-1-D-547/1

1	1) SHUTDOWN PRIMARY BURNER
2	2) SHUTDOWN SECONDARY BURNER
3	3) STOP AGENT FEED (SHUT VALVES & REMOVE AGENT FEED DICO CONR 106)
4	4) STOP DECON FEED (SWITCH TO WATER - 11-XV-102A [11-XV-762A])
5	5) CLOSE DECON/WATER VALVE (13-XV-099 [13-XV-766])
6	6) SHUTDOWN SDS PUMPS (SDS-PUMP-171,-172 (SPARE)[SDS-PUMP-271])
7	7) SHUTDOWN PRIMARY COMBUSTION AIR BLOWER (LIC-BLOW-101 [LIC-BLOW-201])
8	8) SHUTDOWN SECONDARY COMBUSTION AIR BLOWER (LIC-BLOW102 [LIC-BLOW-202])
9	9) SHUTDOWN ID FAN (PAS-BLOW-104 [PAS-BLOW-204])
10	10) PRIMARY CHAMBER BURNER - LOCKOUT
11	11) SECONDARY CHAMBER BURNER - LOCKOUT
12	12) STOP AGENT PUMP (ACS-PUMP-101,-102 (SPARE)[ACS-PUMP-201](DICO TO CONR 106)
13	13) STOP FUEL OIL PURGE
14	14) PRE-ALARM
15	15) ALARM

LN	LIC 1 TAG NUMBER	LIC 2 TAG NUMBER	DESCRIPTION	SETPOINT	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	REMARKS	ALARM BIT B001:XX/XX
38	13-PALL-112B	13-PALL-760B	PRIMARY CHMBR AGENT GUN	5 psig			X												X	RCRA. Enabled when agent feed rate > 500 lb/hr. 10 sec delay after agent feed is active.	0251/10
39	13-PAL-119	13-PAL-732	PRIMARY CHMBR AGENT PUMP DISCHARGE	75 psig															X	Enabled after ACS pump on for 20 sec. Switch to backup agent pump. DICO to ICS-CONR-106	0250/00
40	13-TAH-125	13-TAH-754	PRIMARY CHMBR REFRACTORY	(SP+100)°F														X		SP=setpoint entered in controller by operator	1051/00
41	13-TAL-125	13-TAL-754	PRIMARY CHMBR REFRACTORY	(SP-100)°F														X		SP=setpoint entered in controller by operator	1050/16
42	13-TAH-126	13-TAH-779	SEC. CHAMBER REFRACTORY	2100°F														X			1051/04
43	13-FAH-127	13-FAH-731	PRIMARY CHAMBER AGENT	27 lb/2-min														X		2 minute time delay. Setpoint is 90% of setpoint for 13-FAHH-127A [763A]. See NOTE 1.	0251/04
44	13-FAL-127	13-FAL-731	PRIMARY CHAMBER AVERAGE AGENT	90% OF SP														X		SP=setpoint entered in controller by operator	0250/12
45	13-FDAH-127	13-FDAH-731	PRIMARY CHAMBER AGENT FEED	> 5% DP			X												X	5 sec delay. Enabled when flowrate > 50 lb/hr. Ramp down @ 300 lbs/hr/min.	0221/00
46	13-FQI-127	13-FQI-731	RESET PRIMARY CHAMBER AGENT FEED TOTALIZERS	RESET																Automatic reset at midnight.	0206/00
47	13-FAHH-127A	13-FAHH-731A	PRIMARY CHAMBER AGENT (2 MIN ROLLING AVG)	30 lb/2-min			X	X											X	RCRA . See NOTE 1.	0251/06
48	13-PSLL-127A	13-PSLL-737A	PRIM CHMBR ATOMIZING AIR	12 psig			X	X									X		X	BMS permissive for agent feed and fuel oil purge.	0220/14
49	13-FAHH-127B	13-FAHH-731B	PRIMARY CHAMBER AGENT (10 MIN ROLLING AVG)	142 lb/2-min			X	X											X	RCRA . See NOTE 1.	0251/02
50	13-PSLL-127B	13-PSLL-737B	PRIM CHMBR ATOMIZING AIR	4.0 psig	X		X	X									X		X	3-P running l-lock.	0220/16
51	13-FAHH-127C	13-FAHH-731C	PRIMARY CHAMBER AGENT (10 MIN ROLLING AVG)	833 lb/hr			X	X											X	RCRA . See NOTE 1.	0252/00
52	13-PAL-128	13-PAL-736	PRIMARY CHAMBER ATOMIZING AIR	60 psig			X	X									X		X	RCRA. Enabled when excess air enabled, after 5 sec delay.	0221/10
53	13-PAL-128	13-PAL-736	PRIMARY CHAMBER ATOMIZING AIR	4.0 psig														X		Note: The Feb 2000 TOCDF PLC code has two alarms designated as 13-PAL-128 [736}. One is a RCRA stop feed (see above), and the other is set at 4 psig. 13-PSLL-127C [737C] is no longer used in the code (see FAWB Note B-16).	0250/02
54	13-TAHH-129	13-TAHH-782	SEC. CHAMBER EXHAUST GAS	2200°F			X	X									X		X	RCRA	1022/14
55	13-TAL-129	13-TAL-782	SEC. CHAMBER EXHAUST GAS	1900°F														X			1051/12
56	13-TSLL-129	13-TSLL-782	SEC. CHAMBER EXHAUST GAS	1850°F			X	X									X		X	RCRA. Hardwired shutdown of decon feed (i.e., switch to water).	1021/00
57	13-TSLLL-129	13-TSLLL-782	SEC. CHAMBER EXHAUST GAS	1500°F			X	X	X							X			X	Hardwired open permissive for agent block valves, agent flow control valve, and fuel oil purge block valves.	1020/16
58	13-ASL-132	13-ASL-756	PRIMARY CHMBR EXHAUST O2	3.0%															X	2 sec delay	1021/02
59	13-XY-134A	13-XY-761A	PRIMARY CHAMBER AGENT BLOCK VALVE A	MALF			X														0263/11
60	13-XY-134B	13-XY-761B	PRIMARY CHAMBER AGENT BLOCK VALVE B	MALF			X														0270/11
61	13-PAL-150	13-PAL-742	PRIMARY CHMBR COMB AIR BLWR DISCHARGE	25 in wc														X			0250/04
62	13-PSLL-200	13-PSLL-795	SEC CHAMBER COMB AIR BLWR DISCHARGE	20 in wc											X				X		0420/10
63	13-AAH-228	13-AAH-851	PRIMARY CHMBR EXHAUST CO	100 ppm															X	1 hr rolling average (per min).	1050/00
64	13-ASH-228	13-ASH-851	PRIMARY CHMBR EXHAUST CO	90 ppm															X	2 sec delay	1021/06
65	13-FSLL-230	13-FSLL-808	SEC. CHAMBER SPENT DECON/WATER	110 lb/hr		X													X	60 sec delay. Note: 13-FALL-102 [763] activates the same alarm as 13-FSLL-230 [808]. See FAWB Note B-15.	1022/06
66	13-PSHH-233	13-PSHH-845	PRIMARY CHMBR PRESSURE	-0.25 in wc			X	X									X		X	RCRA. 10 sec delay.	1021/16
67	13-AISH-235	13-AISH-853	FUEL GAS LEAK SEC CHAMBER ROOM	25% LEL			X	X									X		X	2 sec delay	0420/14
68	13-TAHH-610	13-TAHH-710	PRIMARY CHAMBER EXHAUST GAS	2850°F			X	X									X		X	RCRA (alarm not shown on P&IDs)	1022/10

TOCDF ALARM AND INTERLOCK MATRIX

SYSTEM: LIC 1 AND LIC 2 FURNACES
AREA 13
FURNACE CONTROL

PLCs: ICS-CONR-114 (LIC 1) ICS-CONR-119 (LIC 2)
LIC 1 P&IDs: TE-1-D-526, TE-1-D-527/1
LIC 2 P&IDs: TE-1-D-546, TE-1-D-547/1

1) SHUTDOWN PRIMARY BURNER
2) SHUTDOWN SECONDARY BURNER
3) STOP AGENT FEED (SHUT VALVES & REMOVE AGENT FEED DICO CONR 106)
4) STOP DECON FEED (SWITCH TO WATER - 11-XV-102A [11-XV-762A])
5) CLOSE DECON/WATER VALVE (13-XV-099 [13-XV-766])
6) SHUTDOWN SDS PUMPS (SDS-PUMP-171,-172 (SPARE)[SDS-PUMP-271])
7) SHUTDOWN PRIMARY COMBUSTION AIR BLOWER (LIC-BLOW-101 [LIC-BLOW-201])
8) SHUTDOWN SECONDARY COMBUSTION AIR BLOWER (LIC-BLOW102 [LIC-BLOW-202])
9) SHUTDOWN ID FAN (PAS-BLOW-104 [PAS-BLOW-204])
10) PRIMARY CHAMBER BURNER - LOCKOUT
11) SECONDARY CHAMBER BURNER - LOCKOUT
12) STOP AGENT PUMP (ACS-PUMP-101,-102 (SPARE)[ACS-PUMP-201](DICO TO CONR 106)
13) STOP FUEL OIL PURGE
14) PRE-ALARM
15) ALARM

LN	LIC 1 TAG NUMBER	LIC 2 TAG NUMBER	DESCRIPTION	SETPOINT	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	REMARKS	ALARM BIT B001:XX/XX
69	13-TSLL-610	13-TSLL-710	PRIMARY CHMBR EXHAUST GAS	2550°F			X	X									X		X	RCRA. Hardwired agent feed permissive.	1022/00
70	13-TSLLL-610	13-TSLLL-710	PRIMARY CHMBR EXHAUST GAS	2000°F																Purge bypass permissive - STATUS ONLY	NA
71	13-TSLLL-611	71-TSLLL-711	SECONDARY CHMBR EXHAUST	1400°F																Purge bypass permissive - STATUS ONLY	NA
72	13-TISHH-612	13-TISHH-712	PRIMARY CHMBR REFRACTORY	2900°F										X					X	ETL. Hardwired.	1022/12
73	13-TSLL-612	13-TSLL-712	PRIMARY CHMBR REFRACTORY	1400°F																Purge bypass permissive - STATUS ONLY	NA
74	13-TISHH-613	13-TISHH-713	SEC. CHAMBER REFRACTORY	2200°F										X	X				X	ETL. Hardwired.	1022/16
75	13-TSLL-613	13-TSLL-713	SEC. CHAMBER REFRACTORY	1400°F																Purge bypass permissive - STATUS ONLY	NA
76	13-TAL-615	13-TAL-715	SECONDARY EXHAUST GAS	1900°F														X			1051/16
77	13-FAH-720A	13-FAH-720B	FUEL OIL PURGE	1.4 gpm															X	On TE-1-D-526 as 13-FAL-720A/B	0251/16
78	13-FAL-720A	13-FAL-720B	FUEL OIL PURGE	.8 gpm															X		0251/14
79	13-KAL-854	13-KAL-855	LIC RESIDENCE TIME	2.0 sec			X	X									X		X		1052/04
80	13-PDAH-854	13-PDAH-855	SEC CHMBR EXHAUST DIFF. HIGH	0.6 in wc			X	X									X		X	RCRA	1052/02
81	13-PSHH-866	13-PSHH-774	SEC. CHAMBER PILOT FUEL GAS	2.75 psig															X	2 sec delay. Enabled only during pilot trial for ignition,	0421/02
82	13-PAH-868	13-PAH-794	SEC. CHAMBER PILOT FUEL GAS	2.5 psig														X		Enabled only during pilot trial for ignition. LIC 2 setpoint 2.7 psig.	0450/06
83	13-PSHH-873	13-PSHH-882	PRIMARY CHMBR PILOT FUEL GAS	2.75 psig															X	2 sec delay. Enabled only during pilot trial for ignition,	0221/06
84	13-BSLL-909	13-BSLL-913	SECONDARY CHAMBER BURNER IN LOCKOUT	LOCKOUT		X	X	X									X		X		1023/02
85	13-BSLL-912	13-BSLL-908	PRIMARY CHAMBER BURNER IN LOCKOUT	LOCKOUT	X		X	X									X		X		1023/04
86	13-PURG-L1	13-PURG-L2	PRIMARY CHAMBER FUEL OIL PURGE COMPLETE	COMPLETE																	0221/12
87	71-XS-002	71-XS-012	EMERGENCY STOP AT ICS-CONS-110	N/A	X	X	X	X	X	X	X	X	X			X	X		X		1020/00
88	71-XS-022	71-XS-032	EMERGENCY STOP AT ICS-CONS-112	N/A	X	X	X	X	X	X	X	X	X			X	X		X		1020/02
89	71-XS-042	71-XS-052	EMERGENCY STOP AT ICS-CONS-111	N/A	X	X	X	X	X	X	X	X	X			X	X		X		1020/04
90	71-XS-062	71-XS-072	EMERGENCY STOP AT ICS-CONS-115	N/A	X	X	X	X	X	X	X	X	X			X	X		X		1020/06
91	71-XS-082	71-XS-092	EMERGENCY STOP AT ICS-CONS-116	N/A	X	X	X	X	X	X	X	X	X			X	X		X		1020/10

NOTE 1. Agent flow alarms are for GB processing only. Alarm setpoints for other agents will be based on the RCRA permit values, which are currently: VX<580 lb/hr, H/HD/HT<1160 lb/hr.

TOCDF ALARM AND INTERLCOK MATRIX

LIC 1 AND LIC 2 FURNACES
SLAG REMOVAL SYSTEM
MATERIAL HANDLING MATRIX 1

LOCATION
LIC FURNACE ROOM
AREA 12
PLCs: ICS-CONR-114 (LIC 1) ICS-CONR-119 (LIC 2)
P&IDs: TE-SRS-D-001 THRU -011

1) LIC-CNVX-101, 1 = START FWD
2) LIC-CNVX-101, 1 = START REV
3) LIC-DOOR-101, 1 = OPEN
4) LIC-DOOR-101, 1 = CLOSE
5) LIC-CNVX-102, 1 = START FWD
6) LIC-CNVX-102, 1 = START REV
7) LIC-DOOR-102, 1 = OPEN
8) LIC-DOOR-102, 1 = CLOSE
9) LIC-HYPU-101, 1 = RAISE
10) LIC-HYPU-101, 1 = LOWER
11) LIC-CNVX-103, 1 = START FWD
12) LIC-CNVX-103, 1 = START REV
13) LIC-HYPU-102, 1 = RAISE
14) LIC-HYPU-102, 1 = LOWER
15) LIC-CNVX-104, 1 = START FWD
16) LIC-CNVX-104, 1 = START REV
17) LIC-CNVX-105, 1 = START FWD
18) LIC-CNVX-105, 1 = START REV
19) LIC-CNVX-106B CONV, 1 = START FWD
20) LIC-CNVX-106B CONV, 1 = START REV
21) LIC-CNVX-106B LIFT, 1 = RAISE
22) LIC-CNVX-106B LIFT, 1 = LOWER
23) LIC-CNVX-106A CONV, 1 = START FWD
24) LIC-CNVX-106A CONV, 1 = START REV
25) LIC-CNVX-106C CONV, 1 = START FWD
26) LIC-CNVX-106C CONV, 1 = START REV
27) LIC-CNVX-106C LIFT, 1 = RAISE
28) LIC-CNVX-106C LIFT, 1 = LOWER
29) LIC-CNVX-107, 1 = START FWD
30) LIC-CNVX-107, 1 = START REV

NOTES:
1) **INSTRUMENTATION AND LOGIC IN THIS MATRIX HAVE NOT BEEN VERIFIED. SEE APPENDIX D FOR VERIFIED DEVICE LOGIC.**
2) DEVICES ARE SHOWN ACROSS THE TOP, INTERLOCKING CONDITIONS ARE SHOWN DOWN SIDE.
3) SQUARES MARKED BY "X" INDICATE DEVICE IS INTERLOCKED DUE TO THE LISTED CONDITION.
4) SQUARES MARKED WITH NUMBER INDICATE THE BRANCH LEVEL WITHIN THE INTERLOCK RUNG. LIKE NUMBERS ARE COMBINED TO MAKE A BRANCH.
5) SQUARES MARKED WITH A "S" AND A NUMBER INDICATE THAT THE CONDITION IS USED TO SELECT BETWEEN MULTIPLE BRANCH LEVELS WITHIN THE INTERLOCK RUNG. THE NUMBER INDICATES THE BRANCH LEVEL.
6) DESCRIPTION COLUMN AND DEVICES ON TOP LIST LIC 1 EQUIPMENT. FOR LIC 2 EQUIPMENT, CHANGE 100 NUMBER TO 200.

LN	LIC 1 TAG NUMBER	LIC 2 TAG NUMBER	DESCRIPTION	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	REMARKS
1	13-XS-300A/B	13-XS-500A/B	LIC-CNVX-101 ROPE SWITCH ACTIVATED	X	X																													
2	13-HS-301R	13-HS-501R	LIC-CNVX-101 NOT RUNNING REV						1																									
3	13-ZS-304A	13-ZS-504A	LIC-DOOR-101 NOT OPEN	1					1																									
4	13-ZS-304B	13-ZS-504B	LIC-DOOR-101 NOT CLOSED							X																								
5	13-ZS-305A	13-ZS-505A	LIC-DOOR-102 NOT OPEN					1							2																			
6	13-ZS-305B	13-ZS-505B	LIC-DOOR-102 NOT CLOSED			X								X																				
7	13-HS-306R	13-HS-506R	LIC-CNVX-102 NOT RUNNING REV												2																			
8	13-ZS-309A	13-ZS-509A	BARREL IS PRESENT ON LIC-CNVX-101		X																													
9	13-ZS-309B	13-ZS-509B	BARREL IS PRESENT ON LIC-CNVX-101	2																														
10	13-ZS-310A	13-ZS-510A	BARREL IS PRESENT ON LIC-CNVX-102						2																									
11	13-ZS-310B	13-ZS-510B	BARREL IS PRESENT ON LIC-CNVX-102					2																										
12	13-XS-311	13-XS-511	LIC-CNVX-103 ROPE SWITCH ACTIVATED											X	X																			
13	13-HS-312F	13-HS-512F	LIC-CNVX-103 NOT RUNNING FWD					1																										
14	13-HS-312R	13-HS-512R	LIC-CNVX-103 NOT RUNNING REF															2																
15	13-SSL-313	13-SSL-513	LIC-CNVX-103 IS RUNNING FORWARD									X	X																					
16	13-SSL-313	13-SSL-513	LIC-CNVX-103 IS RUNNING REVERSE									X	X																					
17	13-ZS-315A	13-ZS-515A	LIC-HYPU-101 NOT RAISED				1		X						2																			
18	13-ZS-315B	13-ZS-515B	LIC-HYPU-101 NOT LOWERED										2					2																
19	13-XS-316	13-XS-516	LIC-CNVX-104 ROPE SWITCH ACTIVATED															X	X															
20	13-HS-317F	13-HS-517F	LIC-CNVX-104 NOT RUNNING FWD										2																					
21	13-HS-317R	13-HS-517R	LIC-CNVX-104 NOT RUNNING REV																	2														
22	13-SSL-318	13-SSL-518	LIC-CNVX-104 IS RUNNING FORWARD													X	X																	
23	13-SSL-318	13-SSL-518	LIC-CNVX-104 IS RUNNING REVERSE													X	X																	
24	13-ZS-320A	13-ZS-520A	LIC-HYPU-102 NOT RAISED										2					2																
25	13-ZS-320B	13-ZS-520B	LIC-HYPU-102 NOT LOWERED															2		2														
26	13-XS-321	13-XS-521	LIC-CNVX-105 ROPE SWITCH ACTIVATED																X	X														
27	13-HS-322R	13-HS-522R	LIC-CNVX-105 NOT RUNNING REV																			X												
28	13-SSL-323	13-SSL-523	LIC-CNVX-105 IS RUNNING REVERSE																					X						X				
29	13-SSL-323	13-SSL-523	LIC-CNVX-105 IS RUNNING FORWARD																					X						X				
30	13-SSL-324	13-SSL-524	LIC-CNVX-106A NOT RUNNING FWD OR REV																											X	X			
31	13-SSL-325	13-SSL-525	LIC-CNVX-106B IS RUNNING FORWARD																				X							X				
32	13-SSL-325	13-SSL-525	LIC-CNVX-106B IS RUNNING REVERSE																				X							X				
33	13-XS-327A/B	13-XS-527A/B	LIC-CNVX-106A ROPE SWITCH ACTIVATED																						X	X								
34	13-HS-329F	13-HS-529F	LIC-CNVX-106B NOT RUNNING FWD																	2														
35	13-HS-329R	13-HS-529R	LIC-CNVX-106B NOT RUNNING FWD OR REV																				X											
36	13-ZS-331A	13-ZS-531A	LIC-CNVX-106B LIFT NOT RAISED																	2		X	X											
37	13-ZS-331B	13-ZS-531B	LIC-CNVX-106B LIFT NOT LOWERED																						X	X								
38	13-HS-332F	13-HS-532F	LIC-CNVX-106C NOT RUNNING FWD															2																
39	13-HS-332R	13-HS-532R	LIC-CNVX-106C NOT RUNNING REV																			X												
40	13-ZS-334A	13-ZS-534A	LIC-CNVX-106C LIFT NOT RAISED																										X	X				
41	13-ZS-334B	13-ZS-534B	LIC-CNVX-106C LIFT NOT LOWERED																										X	X				
42	13-XS-335A/B	13-XS-535A/B	LIC-CNVX-107 ROPE SWITCH ACTIVATED																													X	X	
43	13-HS-336F	13-HS-536F	LIC-CNVX-107 NOT RUNNING FWD																											X				
44	13-ZS-338	13-ZS-538	BARREL IS PRESENT ON LIC-CNVX-107																														2	
45	13-HS-339F	13-HS-539F	LIC-CNVX-108 NOT RUNNING FWD																													X		
46	13-ZS-347	13-ZS-547	BARREL IS PRESENT ON LIC-CNVX-106B																			X												
47	13-ZS-347	13-ZS-547	BARREL IS PRESENT ON LIC-CNVX-106B																		X							X						
48	13-ZS-348	13-ZS-548	BARREL IS PRESENT ON LIC-CNVX-106C																										X					
49	13-ZS-349	13-ZS-549	BARREL IS PRESENT ON LIC-CNVX-103											1	1																			
50	13-ZS-356	13-ZS-556	BARREL IS PRESENT ON LIC-CNVX-104															X	1															
51	13-HS-360F	13-HS-560F	LIC-CNVX-102 NOT RUNNING FWD	1																														
52	13-ZS-367A	13-ZS-567A	SLIDE GATE OPEN																													X	X	
53	13-ZS-389	13-ZS-589	BARREL IS PRESENT ON LIC-CNVX-105																		X													
54	13-ZS-392	13-ZS-592	BARREL IS PRESENT ON LIC-CNVX-105																	X														

TOCDF ALARM AND INTERLCOK MATRIX

LIC 1 AND LIC 2 FURNACES
SLAG REMOVAL SYSTEM
MATERIAL HANDLING MATRIX 2

LOCATION
LIC FURNACE ROOM
AREA 12
PLCs: ICS-CONR-114 (LIC 1) ICS-CONR-119 (LIC 2)
P&IDs: TE-SRS-D-001 THRU -011

NOTES:

1) **INSTRUMENTATION AND LOGIC IN THIS MATRIX HAVE NOT BEEN VERIFIED. SEE APPENDIX D FOR VERIFIED DEVICE LOGIC.**
2) DEVICES ARE SHOWN ACROSS THE TOP, INTERLOCKING CONDITIONS ARE SHOWN DOWN SIDE.
3) SQUARES MARKED BY "X" INDICATE DEVICE IS INTERLOCKED DUE TO THE LISTED CONDITION.
4) SQUARES MARKED WITH NUMBER INDICATE THE BRANCH LEVEL WITHIN THE INTERLOCK RUNG. LIKE NUMBERS ARE COMBINED TO MAKE A BRANCH.
4) SQUARES MARKED WITH A "S" AND A NUMBER INDICATE THAT THE CONDITION IS USED TO SELECT BETWEEN MULTIPLE BRANCH LEVELS WITHIN THE INTERLOCK RUNG. THE NUMBER INDICATES THE BRANCH LEVEL.
5) DESCRIPTION LISTS LIC 1 EQUIPMENT. FOR LIC 2 EQUIPMENT, CHANGE 100 NUMBER TO 200.

1) LIC-CNVX-108, 1 = START FWD
2) LIC-CNVX-108, 1 = START REV
3) LIC-CNVX-109, 1 = START FWD
4) LIC-CNVX-109, 1 = START REV
5) LIC-CNVX-110, 1 = START FWD
6) LIC-CNVX-110, 1 = START REV
7) SLIDE GATE, 1 = OPEN
8) SLIDE GATE, 1 = CLOSE
9) HAMMERDRILL CARRIAGE, 1 - START FWD
10) HAMMERDRILL CARRIAGE, 1 - START REV
11) HAMMERDRILL HAMMER, 1 - START

LN	LIC 1 TAG NUMBER	LIC 2 TAG NUMBER	DESCRIPTION	01	02	03	04	05	06	07	08	09	10	11	REMARKS
1	13-XS-335A/B	13-XS-535A/B	LIC-CNVX-107 ROPE SWITCH ACTIVATED	X	X	X	X	X	X						
2	13-SSL-337	13-SSL-537	LIC-CNVX-107 NOT RUNNING REVERSE		X										
3	13-ZS-338	13-ZS-538	BARREL NOT PRESENT ON LIC-CNVX-107							X					
4	13-SSL-340	13-SSL-540	LIC-CNVX-108 NOT RUNNING REVERSE				X								
5	13-ZS-341	13-ZS-541	BARREL PRESENT ON LIC-CNVX-108	2	2										
6	13-HS-342F	13-HS-542F	LIC-CNVX-109 NOT RUNNING FORWARD	X											
7	13-SSL-343	13-SSL-543	LIC-CNVX-109 NOT RUNNING REVERSE						X						
8	13-ZS-344	13-ZS-544	BARREL PRESENT ON LIC-CNVX-109			2	2								
9	13-HS-345F	13-HS-545F	LIC-CNVX-110 NOT RUNNING FORWARD			X									
10	13-ZS-346	13-ZS-546	BARREL PRESENT ON LIC-CNVX-110					X	2						
11	13-FI-364	13-FI-564	HAMMERDRILL IS STALLED									X			
12	13-ZS-365	13-ZS-565	HAMMERDRILL CARRIAGE NOT RETRACTED								X				
13	13-ZS-367B	13-ZS-567B	SLIDE GATE CLOSED									X		X	STOP FEED RCRA

TOCDF ALARM AND INTERLOCK MATRIX

LIC 1 AND LIC 2 FURNACES

SLAG REMOVAL SYSTEM

HAMMERDRILL AND TEMPERATURE CONTROL

LOCATION

LIC FURNACE ROOM

AREA 12

PLCs: ICS-CONR-114 (LIC 1) ICS-CONR-119 (LIC 2)

P&IDs: TE-1-H-1/2, TE-1-D-527/2 (LIC 1), TE-1-D-547/2 (LIC 2)

LN	LIC 1 TAG NUMBER	LIC 2 TAG NUMBER	DESCRIPTION	SETPOINT (NOTE 1)	SYSTEM RESPONSE
1	13-FAL-364	13-FAL-564	HAMMERDRILL STALLED	70 rpm	ALARM & INTERLOCK DEVICE (LIC 2 setpoint is 40 rpm)
2	13-TAH-371	13-TAH-571	ZONE #2 HEATER CONTROL TEMP (HI)	1800°F	ALARM
3	13-TAHH-371	13-TAHH-571	ZONE #2 HEATER CONTROL TEMP (HI HI)	2000°F	ALARM & SHUTDOWN ZONE #2 HEATER
4	13-TAL-371	13-TAL-571	ZONE #2 HEATER CONTROL TEMP (LO)	1400°F	ALARM
5	13-TISHHH-371	13-TISHHH-571	ZONE #2 ETL (HI HI HI)	2100°F	ALARM & SHUTDOWN ALL HEATERS (SEE NOTE 2)
6	13-TAH-372	13-TAH-572	ZONE #3 HEATER CONTROL TEMP (HI)	2000°F	ALARM
7	13-TAHH-372	13-TAHH-572	ZONE #3 HEATER CONTROL TEMP (HI HI)	2100°F	ALARM & SHUTDOWN ZONE #2 HEATER
8	13-TAL-372	13-TAL-572	ZONE #3 HEATER CONTROL TEMP (LO)	1600°F	ALARM
9	13-TISHHH-372	13-TISHHH-572	ZONE #3 ETL (HI HI HI)	2200°F	ALARM & SHUTDOWN ALL HEATERS (SEE NOTE 2)
10	13-TAH-374	13-TAH-574	LIC SRS SKIN TEMP (HI)	450°F	ALARM
11	13-TAHH-374	13-TAHH-574	LIC SRS SKIN TEMP (HI HI)	500°F	RCRA AWFCO (STOP AGENT AND DECON FEED).
12	13-TAH-375	13-TAH-575	LIC SRS SKIN TEMP (HI)	450°F	ALARM
13	13-TAHH-375	13-TAHH-575	LIC SRS SKIN TEMP (HI HI)	500°F	RCRA AWFCO (STOP AGENT AND DECON FEED).
14	13-TAH-376	13-TAH-576	LIC SRS SKIN TEMP (HI)	450°F	ALARM
15	13-TAHH-376	13-TAHH-576	LIC SRS SKIN TEMP (HI HI)	500°F	RCRA AWFCO (STOP AGENT AND DECON FEED).
16	13-TAH-377	13-TAH-577	LIC SRS SKIN TEMP (HI)	450°F	ALARM
17	13-TAHH-377	13-TAHH-577	LIC SRS SKIN TEMP (HI HI)	500°F	RCRA AWFCO (STOP AGENT AND DECON FEED).
18	13-TAL-378	13-TAL-578	ZONE #1 SLAG BATH TEMP (LO)	1600°F	ALARM
19	13-TAH-379	13-TAH-579	ZONE #1 HEATER CONTROL TEMP (HI)	2000°F	ALARM
20	13-TAHH-379	13-TAHH-579	ZONE #1 HEATER CONTROL TEMP (HI HI)	2100°F	ALARM & SHUTDOWN ZONE #2 HEATER
21	13-TAL-379	13-TAL-579	ZONE #1 HEATER CONTROL TEMP (LO)	1600°F	ALARM
22	13-TISHHH-379	13-TISHHH-579	ZONE #1 ETL (HI HI HI)	2200°F	ALARM & SHUTDOWN ALL HEATERS (SEE NOTE 2)
23	13-IA-382	13-IA-582	ZONE #1 HEATER CONTROL PHASE IMBALANCE	NA	ALARM (SEE NOTE 3)
24	13-IA-383	13-IA-583	ZONE #2 HEATER CONTROL PHASE IMBALANCE	NA	ALARM (SEE NOTE 3)
25	13-FAH-393	13-FAH-593	SLIDE GATE COOLING FLOW (HI)	8 gpm	ALARM
26	13-TAH-393	13-TAH-593	SLIDE GATE COOLING TEMP (HI)	80°F	ALARM

NOTE 1. Setpoints based on February 2000 TOCDF code.
NOTE 2. Outside operator to reset heater panel.
NOTE 3. Per TE-SOP-115, phase imbalance > 10% can be an early indication of heater failure.

UMCDF LIQUID INCINERATOR (LIC) #1 SYSTEM

UMCDF LIC 1

ALARM AND INTERLOCK MATRIX

UMCDF LIC 1

P&IDs: UM-1-D-526, -527/1, -527/2, and UM-16-D-13; PLC: ICS-CONR-114; INTERLOCK: I-7

CH 2

F00 - SPARE
F01 - SPARE
F02 - SPARE
F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
F13 - CLOSE DECON/PRW VALVE
F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LIQUOR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	LIC 1 TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	B8:011/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	REMARKS	MASK ALARM BIT B001:XX/XX	MASK WORD B8:XX	
1	13 PSLL 008	PRIM CHAMBER FUEL GAS	**2.5 psig**	06 X		LOCKOUT. Ref: UMAP192SRL-R1.	0220/00	NA	CH 1
2	13 PSHH 009	PRIM CHAMBER FUEL GAS	**2.5 psig**	06 X		LOCKOUT. Ref: UMAP192SRL-R1.	0220/02	NA	CH 1
3	13 PAH 032	SEC CHMBR FUEL GAS	3.5 psig		00 X	Setpoint per 11-1-99 teleconference	0450/02	NA	
4	13 PAL 032	SEC CHMBR FUEL GAS	2.5 psig		00 X	Setpoint per 11-1-99 teleconference	0450/00	NA	
5	13 AISH 035	GAS LEAK PRIM CHMBR RM	25% LEL	15 X 14 X 07 X		**Time** delay. Stop feed added by UMAP833PAS (see FAWB Note B-8). Ref: RFI S-ALL-0239.	0220/04	20	CH 1
6	13 FAL 042	PRIM CHMBR COMB. AIR	2400 cfm	**15 X 14 X 07 X**	00 X	Active in excess air mode. Added to TE by TEMP-2050-LIC. Alarm not shown on UM-1-D-526. ANCDF adding alarm by ANAC1038SRL (awaiting approval). SP from TE is subject to change.	0252/00	**248**	CH 1
7	13 FALL 042	PRIM CHMBR COMB. AIR	2300 cfm	15 X 14 X 07 X		Active in excess air mode. See REMARK for 13-FAL-042.	0252/02	**244**	CH 1
8	13 FFAH 042	PRIM CHMBR COMB. AIR	300% EX AIR		00 X	Used during ramp-up and ramp-down only	0250/10	NA	
9	13 FFAL 042	PRIM CHMBR COMB. AIR	15% EX AIR		00 X	Used during ramp-up and ramp-down only	0250/06	NA	
10	13 TAH 043	PRIM CHMBR EXHAUST GAS	(SP+100)°F		00 X	SP=setpoint entered in controller by operator.	1050/10	NA	
11	13 TAL 043	PRIM CHMBR EXHAUST GAS	(SP-100)°F		00 X	SP=setpoint entered in controller by operator.	1050/06	NA	
12	13 TALL 043	PRIM CHMBR EXHAUST GAS	2550°F	15 X 14 X 07 X		MACT AWFCO LIC(M)-4. ROHA. Ref: UMUF866LIC.	**1050/03**	**44**	CH 1
13	13 PSLL 044	PRIM COMB AIR DISCHARGE	35 in. wc.	06 X		4 sec delay; Hardwired. Ref: UMAP192SRL-R1.	0220/06	NA	
14	13 FFAH 050	SEC CHMBR COMB AIR	300% EX AIR		00 X	Used during ramp-up and ramp-down only	0450/12	NA	
15	13 FFAL 050	SEC CHMBR COMB AIR	15% EX AIR		00 X	Used during ramp-up and ramp-down only	0450/10	NA	
16	13 PSL 051	SEC CHMBR SPENT DECON/WATER	45 psig	15 X 14 X 07 X 05 X		RCRA/**MACT** AWFCO LIC 04 **/LIC(M)-5**. Hardwired. Ref: UMAP668LIC. Note: ANCDF SP is 25 psig.	1022/02	**230**	CH 1
17	13 PAH 052	PRIM CHMBR DRAFT	-0.5 in. wc.		00 X	**Time** delay.	1052/00	NA	CH 1
18	13 PAL 052	PRIM CHMBR DRAFT	-10 in. wc.		00 X		1052/10	NA	
19	13 PALL 052	PRIM CHMBR DRAFT	-18 in. wc.		01 X	**Time** delay. Alarm response to be deleted at ANCDF (see FAWB Note B-22).	1052/12	254	CH 1
20	13 PSL 058	DECON/WATER ATOMIZING AIR	65 psig	15 X 14 X 07 X 05 X		RCRA/**MACT** AWFCO LIC 14 **/LIC(M)-17**. Hardwired. Stop feed added by UMAP668LIC.	1022/04	218	CH 1
21	**13 PAH 059**	**SECONDARY CHAMBER PRESS**	**-0.5 in. wc.**		**00 X**	**Prealarm.**	**1022/14**	**NA**	CH 1
22	13 PAH 060A	PRIM CHMBR FUEL GAS	**4.99 psig**		00 X	SP per Sept 2000 AN LIC review mtg. Per DSIC, PIT range to only 5.1 psig.	0250/16	NA	CH 1
23	13 PAL 060A	PRIM CHMBR FUEL GAS	**1.2 psig**		00 X	Setpoint per 11-1-99 teleconference	0250/14	NA	CH 1

UMCDF LIQUID INCINERATOR (LIC) #1 SYSTEM

UMCDF LIC 1 — ALARM AND INTERLOCK MATRIX — **UMCDF LIC 1**

P&IDs: UM-1-D-526, -527/1, -527/2, and UM-16-D-13; PLC: ICS-CONR-114; INTERLOCK: I-7

CH 2

F00 - SPARE
F01 - SPARE
F02 - SPARE
F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
F13 - CLOSE DECON/PRW VALVE
F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LIQUOR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	LIC 1 TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	B8:011/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	PREALARM	REMARKS	MASK ALARM BIT B001:XX/XX	MASK WORD B8:XX	
24	13 PAH 060B	PRIM CHMBR PILOT FUEL	**2.99 psig**			X	Active only during pilot trial for ignition.	0251/00	NA	CH 1
25	13 PAL 061	SEC COMB AIR DISCHARGE	35 in. wc.			X	SP based on Sept 2000 ANCDF mtg.	0450/04	NA	
26	13 PSLL 073	SEC CHMBR FUEL GAS	2.0 psig	05			Hardwired. Ref: UMAP192SRL-R1.	0420/04	NA	
27	13 PSHH 074	SEC CHMBR FUEL GAS	1.3 psig	05			Hardwired. Ref: UMAP192SRL-R1.	0420/06	NA	
28	13 XY 099	SEC CHMBR SPENT DECON/WATER	MALF	14 13			ANCDF is adding 'stop agent feed' response.	1061/11	132	
29	13 FAH 102	SEC CHMBR SPENT DECON	1800 lb/hr	07			SP from AN code for full-rate processing. ANCDF deleted fuel oil purge inhibit response.	1052/06	216	
30	13 FAHH 102A	SEC CHMBR SPENT DECON**/PRW**	73 lb/2 min	15 14 07			RCRA/**MACT** AWFCO LIC 11 **/LIC(M)-14** (2 min rolling avg). Alarm added by UMAP668LIC.	1051/02	**38**	CH 1
31	13 FAHH 102C	SEC CHMBR SPENT DECON**/PRW**	2000 lb/hr	15 14 07			RCRA AWFCO LIC 11 and MACT AWFCO LIC(M)-2 (1 hr rolling avg). Ref: UMAP668LIC and UMUF866LIC. SP to be adjusted periodically to comply with metals/Cl limits.	**1050/02**	**38**	CH 1
32	13 FAL 102	SEC CHMBR SPENT DECON/WATER	225 lb/hr			X	**Time** delay.	1051/06	NA	CH 1
33	13 FALL 102	SEC CHMBR SPENT DECON/WATER	110 lb/hr	16			60 sec delay. At TOCDF, 13-FALL-102 activates the same alarm as 13-FSLL-230, see FAWB Note B-15.	**1022/06**	**102**	CH 1
34	13 TAH 103	SEC CHMBR GAS TEMP CNTL	(SP+100)°F			X	SP=setpoint entered in controller by operator	1050/14	NA	
35	13 TAL 103	SEC CHMBR GAS TEMP CNTL	(SP-100)°F			X	SP=setpoint entered in controller by operator	1050/12	NA	CH 1
36	13 PAL 113	PRIM CHMBR AGENT FEED	7 psig			X	Enabled when agent feed rate > 500 lb/hr (mask value from AN).	0251/12	NA	
37	13 PALL 113	PRIM CHMBR AGENT FEED	5 psig	15 14 07			RCRA/**MACT** AWFCO LIC 05 **/LIC(M)-6.** Enabled when agent feed rate > 500 lb/hr (mask value from AN).	0251/10	232	CH 1
38	13 PSLLL 115	PRIM CHMBR AGENT FEED	50 psig	04			**Time** delay. Ref: UMAP192SRL-R1. 60 sec delay after pump S/U. ANCDF adding stop agent feed response.	0220/12	124	CH 1
39	13 PAL 119	PRIM CHMBR AGENT FEED	75 psig				**Time** delay after pump S/U. Switch to spare agent pump. DICO to ICS-CONR-106.	0250/00	NA	CH 1
40	13 TAH 125	PRIM CHMBR REF TEMP CNTL	(SP+100)°F			X	SP=setpoint entered in controller by operator	1051/00	NA	
41	13 TAL 125	PRIM CHMBR REF TEMP CNTL	(SP-100)°F			X	SP=setpoint entered in controller by operator	1050/16	NA	
42	13 TAH 126	SEC CHMBR REF TEMP	2100°F			X		1051/04	NA	

UMCDF LIQUID INCINERATOR (LIC) #1 SYSTEM

UMCDF LIC 1

ALARM AND INTERLOCK MATRIX

UMCDF LIC 1

P&IDs: UM-1-D-526, -527/1, -527/2, and UM-16-D-13; PLC: ICS-CONR-114; INTERLOCK: I-7

CH 2

F00 - SPARE
F01 - SPARE
F02 - SPARE
F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
F13 - CLOSE DECON/PRW VALVE
F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LIQUOR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	LIC 1 TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	B8:011/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	REMARKS	MASK ALARM BIT B001:XX/XX	MASK WORD B8:XX	
43	13 FAH 127	PRIM CHMBR AGENT FEED	27 lbs/2-min		X	Setpoint per TOCDF code (90% of RCRA alarm for 2-min avg.)	0251/04	NA	
44	13 FAHH 127	PRIM CHMBR AGENT FEED	NOTE 1	X X X		RCRA AWFCO LIC 10 and MACT AWFCO LIC(M)-1 (1 hr rolling avg). See NOTE 1.	**0252/04**	**234**	CH 1
45	13 FAHH 127C	PRIM CHMBR AGENT FEED	NOTE 1	X X X		RCRA AWFCO LIC 10 (2 min rolling avg). See NOTE 1.	0251/06	234	CH 1
46	13 FAL 127	PRIM CHMBR AGENT FEED	SP*90%		X	SP=setpoint entered in controller by operator	0250/12	NA	
47	13 FDAH 127	PRIM CHMBR AGENT FLOW DP	>5% DP	X		**Time** delay. Enabled when flowrate > 50 lb/hr. Ramp down @ 300 lbs/hr/min.	0221/00	NA	CH 1
48	13 FQI 127	RESET TOTALIZERS	RESET			Automatic reset at midnight.	0221/16	NA	
49	13 FQI 127A	AGENT TOTAL COMM ERROR	ERROR			Communication error between basic module and totalizer.	0221/04	NA	
50	13 FQI 127B	AGENT TOTAL COMM ERROR	ERROR			Communication error between basic module and totalizer.	0221/02	NA	
51	13 PSLL 127A	PRIM CHMBR ATOM AIR HARD	40 psig	X X X		SP per UMAP668LIC. BMS permissive for agent feed and fuel oil purge.	0220/14	28	CH 1
52	13 PSLL 127B	PRIM CHMBR ATOMZING AIR	1.5 psig	X X X X		SP per UMAP668LIC. Lockout (3-P running I-lock).	0220/16	28	CH 1
53	13 PSLL 127C	PRIM CHMBR ATOMZING AIR	55 psig	X X X		RCRA/**MACT** AWFCO LIC 13 **/LIC(M)-16**. SP per UMAP668LIC.	0221/10	28	CH 1
54	13 PAL 128	PRIM CHMBR ATOMIZNG AIR	65 psig		X	SP and response per DSIC recommendation at Sept 2000 ANCDF LIC meeting. DSIC also recommends that the alarm be active only if 13-XV-126B is open.	0250/02	NA	
55	13 TAHH 129	SEC CHMBR EXHAUST GAS	2150°F	X X X		RCRA/**MACT** AWFCO LIC 07 **/LIC(M)-9**. Stop feed interlock added by UMAP668LIC.	1052/16	240	CH 1
56	13 TAL 129	SEC CHMBR VENTURI EXH	1900°F		X		1051/12	NA	
57	13 TALL 129	SEC CHMBR VENTURI EXH	1850°F	X X X		MACT AWFCO LIC(M)-**8**. ROHA. Ref: UMUF866LIC.	**1053/02**	**NA**	CH 1
58	13 TSLL 129	SEC CHMBR VENTURI EXH	1850°F	X X X		RCRA/**MACT** AWFCO LIC 06 **/LIC(M)-7**. Ref: UMAP668LIC. Hardwired shutdown of decon feed (i.e., switch to water).	1021/00	32	CH 1

UMCDF LIQUID INCINERATOR (LIC) #1 SYSTEM

UMCDF LIC 1 — ALARM AND INTERLOCK MATRIX — **UMCDF LIC 1**

P&IDs: UM-1-D-526, -527/1, -527/2, and UM-16-D-13; PLC: ICS-CONR-114; INTERLOCK: I-7

CH 2

F00 - SPARE
F01 - SPARE
F02 - SPARE
F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
F13 - CLOSE DECON/PRW VALVE
F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LIQUOR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	LIC 1 TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	B8:011/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	REMARKS	MASK ALARM BIT B001:XX/XX	MASK WORD B8:XX	
59	13 TSLLL 129	SEC CHMBR VENTURI EXH	1500°F	X X X X		Hardwired open permissive for agent block valves, agent flow control valve, and fuel oil purge block valves.	1020/16	134	CH 1
60	13 XY 134A	PRIM CHMBR AGENT VLV A	MALF	X			0263/11	126	
61	13 XY 134B	PRIM CHMBR AGENT VLV B	MALF	X			0270/11	130	
62	13 PAL 150	PRIM COMB AIR DISCHARGE	40 in. wc.		X	SP based on Sept 2000 AN LIC mtg. Ref. UMAP191LIC-R1.	0250/04	NA	
63	13 PSLL 200	SEC COMB AIR DISCHARGE	30 in. wc.	X X X X		RCRA/**MACT** AWFCO LIC 08 **/LIC(M)-10**. Lockout. Ref: UMAP668LIC.	0420/10	**NA**	CH 1
64	13 FSLL 230	SEC CHMBR DECON/WATER	**100 lb/hr**	X		**Time** delay. At TOCDF, 13-FSLL-230 activates the same alarm as 13-FALL-102, see FAWB Note B-15.	1022/06	**102**	CH 1
65	13 PSHH 233	PRIM CHMBR CHAMBER	-0.25 in. wc.	X X X X		RCRA AWFCO LIC 01 and MACT AWFCO LIC(M)-**1**. Ref: UMAP668LIC and UMUF866LIC.	1021/16	136	CH 1
66	13 AISH 235	GAS LEAK SEC CHMBR RM	25% LEL	X X X X		**Time** delay. Stop feed not shown on P&ID (see FAWB Note B-8). Being added per RFI S-ALL-0239.	0420/14	40	CH 1
67	13 XS 300A/B	LIC-CNVX-101 ROPE SWITCH	activated			S/D LIC-CNVX-101**.**	2620/00	NA	CH 1
68	13 SSL 302	LIC-CNVX-101 SPEED LOW	zero speed	X		S/D LIC-CNVX-101 on time delay.	2660/11	NA	
69	13 SSL 307	LIC-CNVX-102 SPEED LOW	zero speed	X		S/D LIC-CNVX-102 on time delay.	2662/11	NA	
70	13 XS 311	LIC-CNVX-103 ROPE SWITCH	activated			S/D LIC-CNVX-103**.**	2620/02	NA	CH 1
71	13 SSL 313	LIC-CNVX-103 SPEED LOW	zero speed	X		S/D LIC-CNVX-103 on time delay.	2665/11	NA	
72	13 XS 316	LIC-CNVX-104 ROPE SWITCH	activated			S/D LIC-CNVX-104**.**	2620/04	NA	CH 1
73	13 SSL 318	LIC-CNVX-104 SPEED LOW	zero speed	X		S/D LIC-CNVX-104 on time delay.	2667/11	NA	
74	13 XS 321	LIC-CNVX-105 ROPE SWITCH	activated			S/D LIC-CNVX-105**.**	2620/06	NA	CH 1
75	13 SSL 323	LIC-CNVX-105 SPEED LOW	zero speed	X		S/D LIC-CNVX-105 on time delay.	2668/11	NA	
76	13 SSL 324	LIC-CNVX-106A SPEED LOW	zero speed	X		S/D LIC-CNVX-106A on time delay.	2671/11	NA	
77	13 SSL 325	LIC-CNVX-106B SPEED LOW	zero speed	X		S/D LIC-CNVX-106B on time delay.	2669/11	NA	
78	13 SSL 326	LIC-CNVX-106C SPEED LOW	zero speed	X		S/D LIC-CNVX-106C on time delay.	2672/11	NA	
79	13 XS 327A/B	LIC-CNVX-106A ROPE SWITCH	activated			S/D LIC-CNVX-106A**.**	2620/10	NA	CH 1
80	13 XS 335A/B	LIC-CNVX-107 ROPE SWITCH	activated			S/D LIC-CNVX-107**.**	2620/12	NA	CH 1
81	13 SSL 337	LIC-CNVX-107 SPEED LOW	zero speed	X		S/D LIC-CNVX-107 on time delay.	2674/11	NA	
82	13 SSL 340	LIC-CNVX-108 SPEED LOW	zero speed	X		S/D LIC-CNVX-108 on time delay.	2675/11	NA	
83	13 SSL 343	LIC-CNVX-109 SPEED LOW	zero speed	X		S/D LIC-CNVX-109 on time delay.	2676/11	NA	
84	13 SSL 349	LIC-CNVX-110 SPEED LOW	zero speed	X		S/D LIC-CNVX-110 on time delay.	2677/11	NA	

UMCDF LIQUID INCINERATOR (LIC) #1 SYSTEM

UMCDF LIC 1 — ALARM AND INTERLOCK MATRIX — **UMCDF LIC 1**

P&IDs: UM-1-D-526, -527/1, -527/2, and UM-16-D-13; PLC: ICS-CONR-114; INTERLOCK: I-7

CH 2

F00 - SPARE
F01 - SPARE
F02 - SPARE
F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
F13 - CLOSE DECON/PRW VALVE
F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LIQUOR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	LIC 1 TAG NUMBER			DESCRIPTION		SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	MASK ALARM BIT B001:XX/XX	MASK WORD B8:XX	
85	13	ZS	367B	SLIDE GATE	NOT CLOSED	Not Closed			X	X					X																								RCRA/**MACT** AWFCO LIC 32 **/LIC(M)-33**. See NOTE 3.	2620/14	236	CH 1
86	13	IA	382	LIC-HEAT-101	ZONE 1 PHASE	IMBALANCE																																		2820/12	NA	
87	13	IA	383	LIC-HEAT-102	ZONE 2 PHASE	IMBALANCE																																		2820/14	NA	
88	13	TAHH	610	PRIM CHMBR	EXHAUST GAS	2850°F			X	X					X																								RCRA/**MACT** AWFCO LIC 02 **/LIC(M)-2**. Stop feed interlock added by UMAP668LIC.	1052/14	238	CH 1
89	13	TSLL	610	PRIM CHMBR	EXH GAS	2550°F			X	X					X																								RCRA/**MACT** AWFCO LIC 03 **/LIC(M)-3**. Ref: UMAP668LIC.	1022/00	42	CH 1
90	13	TSLLL	610	PRIM CHMBR	EXH GAS	1400°F																																		Ref: UMAP223SRL. Note: TOCDF setpoint 2000°F.	**1006/00**	NA	CH 1
91	13	TSLLL	611	SEC CHMBR	EXHAUST GAS	1400°F																																		Purge bypass permissive - STATUS ONLY	**1006/01**	NA	CH 1
92	13	TISHH	612	PRIM CHMBR	REFRACTRY-ETL	2900°F			X	X					X	X																								Hardwired.	1022/12	NA	
93	13	TSLL	612	PRIM CHMBR	REFRACTORY	1400°F																																		Purge bypass permissive - STATUS ONLY	**1006/00**	NA	CH 1
94	13	TSLLL	612	PRIM CHMBR	REFRACTORY	**3.90 mA**			X	X					X	X																								Hardwired. Activates the same alarm as 13-TISHH-612. Fail safe in case 4-20 mA circuit opens.	1022/12	NA	CH 1
95	13	TISHH	613	SEC CHMBR	REFRACTRY-ETL	2200°F			X	X					X	X	X																							Hardwired. See FAWB Note B-20.	1022/16	NA	
96	13	TSLL	613	SEC CHMBR	REFRACTORY	1400°F																																		Purge bypass permissive - STATUS ONLY	**1006/01**	NA	CH 1
97	13	TSLLL	613	SEC CHMBR	REFRACTORY	**3.90 mA**			X	X					X	X	X																							Hardwired. Activates the same alarm as 13-TISHH-613. Fail safe in case 4-20 mA circuit opens.	1022/16	NA	CH 1
98	13	TAL	615	SEC CHMBR	EXHAUST GAS	1900°F																																	X		1051/16	NA	
99	13	PSLL	708	LIC-PUMP-104	DISCH PRESS	50 psig									X																								Hardwired S/D of LIC purge fuel oil pump (LIC-PUMP-104) and close purge fuel oil block valves thru FSSS.	**NA**	**NA**	CH 1
100	13	FAL	720A	PRIM CHMBR	F.O. PURGE	0.80 gpm																																	X		0251/14	NA	
101	13	KAL	854	SEC CHMBR	EXHAUST GAS	2.0 sec			X	X					X																										1052/04	52	
102	13	PDAH	854	SEC CHMBR	EXHAUST GAS	0.6 in. wc.			X	X					X																								RCRA/**MACT** AWFCO LIC 09 **/LIC(M)-11** (instantaneous). Ref: UMAP668LIC and UMUF866LIC.	**1053/04**	56	CH 1
103	**13**	**PDAH**	**854A**	**SEC CHMBR**	**EXHAUST GAS**	**0.6 in. wc.**			**X**	**X**					**X**																								**MACT AWFCO LIC(M)-12 (ROHA). Ref: UMAP668LIC and UMUF866LIC.**	**1053/04**	**56**	CH 1
104	13	PSHH	866	SEC CHMBR	PILOT GAS	2.75 psig																																		**Time** delay.	0421/02	NA	CH 1
105	13	PAH	868	SEC CHMBR	PILOT GAS	2.6 psig																																	X		Setpoint per 11-1-99 teleconference based on 13-PCV-889 set at 2.45 psig (Ref. UMAP192SRL-R1).	0450/06	NA	

UMCDF LIQUID INCINERATOR (LIC) #1 SYSTEM

UMCDF LIC 1 — ALARM AND INTERLOCK MATRIX — **UMCDF LIC 1**

P&IDs: UM-1-D-526, -527/1, -527/2, and UM-16-D-13; PLC: ICS-CONR-114; INTERLOCK: I-7

B8:010/	B8:011/
F00 - SPARE	**P17 - SPARE**
F01 - SPARE	**P16 - SPARE**
F02 - SPARE	**P15 - SPARE**
F03 - SPARE	**P14 - SPARE**
F04 - S/D AGENT PUMPS	**P13 - OPEN QUENCH EMERG. PRW**
F05 - LOCKOUT - SECONDARY BURNER	**P12 - S/D WATER RETURN PMP**
F06 - LOCKOUT - PRIMARY BURNER	**P11 - BKUP BRINE PMP ON**
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE	**P10 - BKUP CLEAN LIQUOR PMP ON**
F10 - S/D SEC COMB AIR BLOWER	**P07 - S/D EMPTY OUT PUMP**
F11 - S/D PRI COMB AIR BLOWER	**P06 - S/D BRINE PUMPS**
F12 - S/D SDS PUMPS	**P05 - S/D CLEAN LIQUOR PUMPS**
F13 - CLOSE DECON/PRW VALVE	**P04 - S/D 1ST & 2ND STAGE ID FAN**
F14 - STOP DECON FEED/SWITCH TO PRW	**P03 - SPARE**
F15 - STOP AGENT FEED	**P02 - SPARE**
F16 - S/D SEC BURNER	**P01 - S/D 1ST STAGE ID FAN**
F17 - S/D PRI BURNER	**P00 - S/D 2ND STAGE ID FAN**
MALFUNCTION	**PREALARM**

ITM NUM	LIC 1 TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	B8:011/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	REMARKS	MASK ALARM BIT B001:XX/XX	MASK WORD B8:XX	
106	13 PSHH 873	PRIM CHMBR PILOT GAS	4.0 psig			**Time** delay. Ref: UMAP192SRL-R1 for setpoint.	0221/06	NA	CH 1
107	13 PSHH 888	SEC CHMBR CHAMBER	-0.25 in. wc.	15 14 07		RCRA/**MACT** AWFCO LIC 28 **/LIC(M)-30**. Pressure switch added to UM design per letter CPA-1243. SP per UMAP668LIC.	1022/10	**136**	CH 1
108	13 BSLL 909	SEC CHMBR BMS SYSTEM	LOCKOUT	15 14 07		RCRA/**MACT** AWFCO LIC 31 **/LIC(M)-32**.	1023/02	50	CH 1
109	13 BSLL 912	PRIM CHMBR BMS SYSTEM	LOCKOUT	15 14 07		RCRA/**MACT** AWFCO LIC 30 **/LIC(M)-31**.	1023/04	48	CH 1
110	13 XS 925	BURNER MANAG LOCAL E-STOP	E-STOP	17 16 15 14 07			1023/10	60	
111	13 PURG L1	PRIM CHMBR F.O. PURGE	Complete				0221/12	NA	
112	28 LAHH 702	OIL-TANK-101 LEVEL HIGH-HIGH	**99%**	**07**			**3450/02**	**84**	CH 1
113	28 LALL 702	OIL-TANK-101 LEVEL LOW-LOW	**93%**	**07**			**3450/00**	**84**	CH 1
114	28 LSL 702	OIL-TANK-101 LEVEL LOW	3200 gal	**07**		Hardwired S/D of LIC purge fuel oil pump.	**3420/00**	**84**	CH 1
115	71 XS 002	EMERGENCY S/D AT CONS-110	E-STOP	17 16 15 14 13 12 11 10 07 05 03 12 07 05 04			1020/00	58	
116	71 XS 022	EMERGENCY S/D AT CONS-112	E-STOP	17 16 15 14 13 12 11 10 07 05 03 12 07 05 04			1020/02	58	
117	71 XS 042	EMERGENCY S/D AT CONS-111	E-STOP	17 16 15 14 13 12 11 10 07 05 03 12 07 05 04			1020/04	58	
118	71 XS 062	EMERGENCY S/D AT CONS-115	E-STOP	17 16 15 14 13 12 11 10 07 05 03 12 07 05 04			1020/06	58	
119	71 XS 082	EMERGENCY S/D AT CONS-116	E-STOP	17 16 15 14 13 12 11 10 07 05 03 12 07 05 04			1020/10	58	
120	71 XS 142A	EMERGENCY S/D AT CONS-108	E-STOP	17 16 15 14 13 12 11 10 07 05 03 12 07 05 04		Added per UMAC330INS.	1023/00	58	
121		BRA TANKS LVL HI-HI / UNAVAILABLE	DICO	15 14 07		RCRA AWFCO LIC 19. See BRA FAWB for tag #s and setpoints.	B4:23/01	210	
122		LIC#1 PAS/PFS NORMAL	NOT NORMAL	**17** 15 14 07		ANCDF deleted all interlocks.	B601/00	**260**	CH 1

NOTE 1: Agent/surrogate feed rate alarm setpoints are: Surrogate 1160 lb/hr, 42 lb/2 min; VX 680 lb/hr, 24 lb/2 min; GB 1030 lb/hr, 37 lb/2 min; HD 1305 lb/hr, 47 lb/2 min. Interlocks were added for 13-FAHH-127C/127D by UMAP668LIC and for 13-FAHH-127 by UMUF866LIC. CH 1 CH 1

NOTE 2: The CEMS alarms in the A&I matrix reflect the alarms in approved RFI S-ALL-249, which documents the operation, alarm, interlock requirements, and setpoints for the CEMS non-agent monitors. These requirements were derived from the Code of Federal Regulations (40 CFR, Part 60), site RCRA and air permits, and process requirements. ECP UMAC908MON, R2 has been issued, however, that modifies the CEMS configuration to delete the CEMS immediately after the afterburners and move the RCRA CEMS to after the ID fans. These alarms will be included in the PAS/PFS FAWB, Book 28.

NOTE 3: SRS flow and temperature alarms are not listed because there are numerous discrepancies between the UMCDF design and the expected UMCDF configuration. PMCD has directed that UMCDF implement the final TOCDF LIC SRS configuration, however, the UMCDF design still reflects the original TOCDF configuration and has not been revised to reflect the numerous changes that TOCDF has made. The remaining SRS alarms will be added to the A&I matrix when the UMCDF SC has established the SRS configuration.

CH 2

UMCDF LIQUID INCINERATOR (LIC) #2 SYSTEM

UMCDF LIC 2 — ALARM AND INTERLOCK MATRIX — **UMCDF LIC 2**

P&IDs: UM-1-D-546, -547/1, -547/2 and UM-16-D-13; PLCs: ICS-CONR-119; INTERLOCK: I-22

F00 - SPARE
F01 - SPARE
F02 - SPARE
F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
F13 - CLOSE DECON/PRW VALVE
F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - S/D PFS-COOL-213A Fan B (Note 1) CH 3
P16 - S/D PFS-COOL-213A Fan A (Note 1) CH 3
P15 - S/D PFS-COOL-213B Fan B (Note 1) CH 3
P14 - S/D PFS-COOL-213B Fan A (Note 1) CH 3
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON (Note 1) CH 3
P10 - BKUP CLEAN LIQUOR PMP ON (Note 1) CH 3
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - Bypass carbon filter (Note 1) CH 3
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	LIC 2 TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	B8:011/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	REMARKS	MASK ALARM BIT B001:XX/XX	MASK WORD B8:XX	
1	13 XS 500A/B	LIC-CNVX-201 ROPE SWITCH	activated			S/D LIC-CNVX-201.	2620/00	NA	CH 2
2	13 SSL 502	LIC-CNVX-201 SPEED LOW	zero speed	X		S/D LIC-CNVX-201 on time delay.	2660/11	NA	
3	13 SSL 507	LIC-CNVX-202 SPEED LOW	zero speed	X		S/D LIC-CNVX-202 on time delay.	2662/11	NA	
4	13 XS 511	LIC-CNVX-203 ROPE SWITCH	activated			S/D LIC-CNVX-203.	2620/02	NA	CH 2
5	13 SSL 513	LIC-CNVX-203 SPEED LOW	zero speed	X		S/D LIC-CNVX-203 on time delay.	2665/11	NA	
6	13 XS 516	LIC-CNVX-204 ROPE SWITCH	activated			S/D LIC-CNVX-204.	2620/04	NA	CH 2
7	13 SSL 518	LIC-CNVX-204 SPEED LOW	zero speed	X		S/D LIC-CNVX-204 on time delay.	2667/11	NA	
8	13 XS 521	LIC-CNVX-205 ROPE SWITCH	activated			S/D LIC-CNVX-205.	2620/06	NA	CH 2
9	13 SSL 523	LIC-CNVX-205 SPEED LOW	zero speed	X		S/D LIC-CNVX-205 on time delay.	2668/11	NA	
10	13 SSL 524	LIC-CNVX-206A SPEED LOW	zero speed	X		S/D LIC-CNVX-206A on time delay.	2671/11	NA	
11	13 SSL 525	LIC-CNVX-206B SPEED LOW	zero speed	X		S/D LIC-CNVX-206B on time delay.	2669/11	NA	
12	13 SSL 526	LIC-CNVX-206C SPEED LOW	zero speed	X		S/D LIC-CNVX-206C on time delay.	2672/11	NA	
13	13 XS 527A/B	LIC-CNVX-206A ROPE SWITCH	activated			S/D LIC-CNVX-206A.	2620/10	NA	CH 2
14	13 XS 535A/B	LIC-CNVX-207 ROPE SWITCH	activated			S/D LIC-CNVX-207.	2620/12	NA	CH 2
15	13 SSL 537	LIC-CNVX-207 SPEED LOW	zero speed	X		S/D LIC-CNVX-207 on time delay.	2674/11	NA	
16	13 SSL 540	LIC-CNVX-208 SPEED LOW	zero speed	X		S/D LIC-CNVX-208 on time delay.	2675/11	NA	
17	13 SSL 543	LIC-CNVX-209 SPEED LOW	zero speed	X		S/D LIC-CNVX-209 on time delay.	2676/11	NA	
18	13 SSL 549	LIC-CNVX-210 SPEED LOW	zero speed	X		S/D LIC-CNVX-210 on time delay.	2677/11	NA	
19	13 ZS 567B	SLIDE GATE NOT CLOSED	Not Closed	X X X		RCRA/**MACT** AWFCO LIC 32 **/LIC(M)-33**. See NOTE 3.	2620/14	236	CH 2
20	13 IA 582	LIC-HEAT-201 ZONE 1 PHASE	IMBALANCE				2820/12	NA	
21	13 IA 583	LIC-HEAT-202 ZONE 2 PHASE	IMBALANCE				2820/14	NA	
22	**13 PAH 703**	**SECONDARY CHAMBER PRESS**	**-0.5 in. wc.**		X	**Prealarm.**	**1022/14**	**NA**	CH 2
23	13 PAH 706	PRIM CHMBR DRAFT	-0.5 in. wc.		X	**Time** delay.	1052/00	NA	CH 2
24	13 PAL 706	PRIM CHMBR DRAFT	-10 in. wc.		X		1052/10	NA	
25	13 PALL 706	PRIM CHMBR DRAFT	-18 in. wc.		X	**Time** delay. Alarm response to be deleted at ANCDF (see FAWB Note B-22).	1052/12	254	CH 2
26	13 PSLL 708	LIC-PUMP-104 DISCH PRESS	50 psig	X		Hardwired S/D of LIC purge fuel oil pump (LIC-PUMP-104) and close purge fuel oil block valves thru FSSS.	**NA**	**NA**	CH 2
27	13 TAHH 710	PRIM CHMBR EXHAUST GAS	2850°F	X X X		RCRA/**MACT** AWFCO LIC 02 **/LIC(M)-2**. Stop feed interlock added by UMAP668LIC.	1052/14	238	CH 2
28	13 TSLL 710	PRIM CHMBR EXH GAS	2550°F	X X X		RCRA/**MACT** AWFCO LIC 03 **/LIC(M)-3**. Ref: UMAP668LIC.	1022/00	42	CH 2
29	13 TSLLL 710	PRIM CHMBR EXH GAS	1400°F			Ref: UMAP223SRL. Note: TOCDF setpoint 2000°F.	**1006/00**	NA	CH 2

UMCDF LIQUID INCINERATOR (LIC) #2 SYSTEM

UMCDF LIC 2 — ALARM AND INTERLOCK MATRIX — **UMCDF LIC 2**

P&IDs: UM-1-D-546, -547/1, -547/2 and UM-16-D-13; PLCs: ICS-CONR-119; INTERLOCK: I-22

F00 - SPARE
F01 - SPARE
F02 - SPARE
F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
F13 - CLOSE DECON/PRW VALVE
F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - S/D PFS-COOL-213A Fan B (Note 1) CH 3
P16 - S/D PFS-COOL-213A Fan A (Note 1) CH 3
P15 - S/D PFS-COOL-213B Fan B (Note 1) CH 3
P14 - S/D PFS-COOL-213B Fan A (Note 1) CH 3
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON (Note 1) CH 3
P10 - BKUP CLEAN LIQUOR PMP ON (Note 1) CH 3
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - Bypass carbon filter (Note 1) CH 3
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	LIC 2 TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	B8:011/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	REMARKS	MASK ALARM BIT B001:XX/XX	MASK WORD B8:XX	
30	13 TSLLL 711	SEC CHMBR EXHAUST GAS	1400°F			Purge bypass permissive - STATUS ONLY	**1006/01**	NA	CH 2
31	13 TISHH 712	PRIM CHMBR REFRACTRY-ETL	2900°F	15 14 07 06		Hardwired.	1022/12	NA	
32	13 TSLL 712	PRIM CHMBR REFRACTORY	1400°F			Purge bypass permissive - STATUS ONLY	**1006/00**	NA	CH 2
33	13 TSLLL 712	PRIM CHMBR REFRACTORY	**3.90 mA**	15 14 07 06		Hardwired. Activates the same alarm as 13-TISHH-712. Fail safe in case 4-20 mA circuit opens.	1022/12	NA	CH 2
34	13 TISHH 713	SEC CHMBR REFRACTRY-ETL	2200°F	15 14 07 06 05		Hardwired. See FAWB Note B-20.	1022/16	NA	
35	13 TSLL 713	SEC CHMBR REFRACTORY	1400°F			Purge bypass permissive - STATUS ONLY	**1006/01**	NA	CH 2
36	13 TSLLL 713	SEC CHMBR REFRACTORY	**3.90 mA**	15 14 07 06 05		Hardwired. Activates the same alarm as 13-TISHH-713. Fail safe in case 4-20 mA circuit opens.	1022/16	NA	CH 2
37	13 TAL 715	SEC CHMBR EXHAUST GAS	1900°F		00		1051/16	NA	
38	13 FAL 720B	PRIM CHMBR F.O. PURGE	0.80 gpm		00	**Time delay.**	0251/14	NA	CH 3
39	13 FAH 731	PRIM CHMBR AGENT FEED	**40 lbs/2-min**		00	Setpoint per TOCDF code (90% of RCRA alarm for 2-min avg.) **Time delay.**	0251/04	NA	CH 3
40	13 FAHH 731	PRIM CHMBR AGENT FEED	**1160 lbs/hr Note 4**	15 14 07		RCRA AWFCO LIC 10 and MACT AWFCO LIC(M)-**13** (1 hr rolling avg). See NOTE **4**.	**0252/04**	**TBD**	CH 2/3
41	13 FAHH 731C	PRIM CHMBR AGENT FEED	**42 lbs/2-min Note 4**	15 14 07		RCRA AWFCO LIC 10 (2 min rolling avg) **and MACT AWFCO LIC(M)-13**. See NOTE **4**.	0251/06	234	CH 2/3
42	13 FAL 731	PRIM CHMBR AGENT FEED	SP*90%		00	SP=setpoint entered in controller by operator	0250/12	NA	
43	13 FDAH 731	PRIM CHMBR AGENT FLOW DP	>5% DP	15		**Time** delay. Enabled when flowrate > 50 lb/hr. Ramp down @ 300 lbs/hr/min.	0221/00	NA	CH 2
44	13 FQI 731	RESET TOTALIZERS	RESET			Automatic reset at midnight.	0221/16	NA	
45	13 FQI 731A	AGENT TOTAL COMM ERROR	ERROR			Communication error between basic module and totalizer.	0221/04	NA	
46	13 FQI 731B	AGENT TOTAL COMM ERROR	ERROR			Communication error between basic module and totalizer.	0221/02	NA	
47	13 PAL 732	PRIM CHMBR AGENT FEED	75 psig		00	**Time** delay after pump S/U. Switch to spare agent pump. DICO to ICS-CONR-106.	0250/00	NA	CH 2/3
48	13 PSLLL 733	PRIM CHMBR AGENT FEED	50 psig	04		**Time** delay. Ref: UMAP192SRL-R1. 60 sec delay after pump S/U. ANCDF adding stop agent feed response.	0220/12	124	CH 2
49	13 PAL 736	PRIM CHMBR ATOMIZNG AIR	65 psig		00	SP and response per DSIC recommendation at Sept 2000 ANCDF LIC meeting. DSIC also recommends that the alarm be active only if 13-XV-735B is open.	0250/02	NA	

UMCDF LIQUID INCINERATOR (LIC) #2 SYSTEM

UMCDF LIC 2

ALARM AND INTERLOCK MATRIX

UMCDF LIC 2

P&IDs: UM-1-D-546, -547/1, -547/2 and UM-16-D-13; PLCs: ICS-CONR-119; INTERLOCK: I-22

F00 - SPARE
F01 - SPARE
F02 - SPARE
F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
F13 - CLOSE DECON/PRW VALVE
F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - S/D PFS-COOL-213A Fan B (Note 1)
P16 - S/D PFS-COOL-213A Fan A (Note 1)
P15 - S/D PFS-COOL-213B Fan B (Note 1)
P14 - S/D PFS-COOL-213B Fan A (Note 1)
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON (Note 1)
P10 - BKUP CLEAN LIQUOR PMP ON (Note 1)
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - Bypass carbon filter (Note 1)
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	LIC 2 TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	B8:011/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	REMARKS	MASK ALARM BIT B001:XX/XX	MASK WORD B8:XX
50	13 PSLL 737A	PRIM CHMBR ATOM AIR HARD	40 psig	X X X		SP per UMAP668LIC. BMS permissive for agent feed and fuel oil purge.	0220/14	28
51	13 PSLL 737B	PRIM CHMBR ATOMZING AIR	1.5 psig	X X X X		SP per UMAP668LIC. Lockout (3-P running I-lock).	0220/16	28
52	13 PSLL 737C	PRIM CHMBR ATOMZING AIR	55 psig	X X X		RCRA/**MACT** AWFCO LIC 13 /**LIC(M)-16**. SP per UMAP668LIC.	0221/10	28
53	13 PAL 738	SEC COMB AIR DISCHARGE	35 in. wc.		X	SP based on Sept 2000 ANCDF mtg.	0450/04	NA
54	13 PSLL 741	PRIM COMB AIR DISCHARGE	35 in. wc.	X		4 sec delay; Hardwired. Ref: UMAP192SRL-R1.	0220/06	NA
55	13 PAL 742	PRIM COMB AIR DISCHARGE	40 in. wc.		X	SP based on Sept 2000 AN LIC mtg. Ref. UMAP191LIC-R1.	0250/04	NA
56	13 FAL 743	PRIM CHMBR COMB. AIR	2400 cfm		X	Active in excess air mode. Added to TE by TEMP-2050-LIC. Alarm not shown on UM-1-D-546. ANCDF adding alarm by ANAC1038SRL (awaiting approval). SP from TE is subject to change.	0252/00	**NA**
57	13 FALL 743	PRIM CHMBR COMB. AIR	2300 cfm	X X X		Active in excess air mode. See REMARK for 13-FAL-743.	0252/02	**244**
58	13 FFAH 743	PRIM CHMBR COMB. AIR	300% EX AIR		X	Used during ramp-up and ramp-down only	0250/10	NA
59	13 FFAL 743	PRIM CHMBR COMB. AIR	15% EX AIR		X	Used during ramp-up and ramp-down only	0250/06	NA
60	13 PAH 745	PRIM CHMBR FUEL GAS	**4.99 psig**		X	SP per Sept 2000 AN LIC review mtg. Per DSIC, PIT range to only 5.1 psig.	0250/16	NA
61	13 PAL 745	PRIM CHMBR FUEL GAS	**1.2 psig**		X	Setpoint per 11-1-99 teleconference	0250/14	NA
62	13 PSLL 746	PRIM CHAMBER FUEL GAS	**2.5 psig**	X		LOCKOUT. Ref: UMAP192SRL-R1. **Hardwired.**	0220/00	NA
63	13 PAH 746B	PRIM CHMBR PILOT FUEL	**2.99 psig**		X	Active only during pilot trial for ignition.	0251/00	NA
64	13 PSHH 748	PRIM CHAMBER FUEL GAS	**2.5 psig**	X		LOCKOUT. Ref: UMAP192SRL-R1. **Hardwired.**	0220/02	NA
65	13 TAH 752	PRIM CHMBR EXHAUST GAS	(SP+100)°F		X	SP=setpoint entered in controller by operator.	1050/10	NA
66	13 TAL 752	PRIM CHMBR EXHAUST GAS	(SP-100)°F		X	SP=setpoint entered in controller by operator.	1050/06	NA
67	13 TALL 752**A**	PRIM CHMBR EXHAUST GAS	2550°F	X X X		MACT AWFCO LIC(M)-4. ROHA. Ref: UMUF866LIC.	**1053/00**	**44**
68	13 TAH 754	PRIM CHMBR REF TEMP CNTL	(SP+100)°F		X	SP=setpoint entered in controller by operator	1051/00	NA
69	13 TAL 754	PRIM CHMBR REF TEMP CNTL	(SP-100)°F		X	SP=setpoint entered in controller by operator	1050/16	NA
70	**13 PSLL 760**	**PRIM CHMBR AGENT FEED**	**55 psig**	**X**		**20 sec delay after pump S/U. Was RCRA AWFCO w/ 5 psig SP, but removed by UMAP668LIC. SP per vendor data sheet.**	**0220/10**	**26**
71	13 PAL 761	PRIM CHMBR AGENT FEED	7 psig		X	Enabled when agent feed rate > 500 lb/hr (mask value from AN).	0251/12	NA

UMCDF LIQUID INCINERATOR (LIC) #2 SYSTEM

UMCDF LIC 2

ALARM AND INTERLOCK MATRIX

UMCDF LIC 2

P&IDs: UM-1-D-546, -547/1, -547/2 and UM-16-D-13; PLCs: ICS-CONR-119; INTERLOCK: I-22

F00 - SPARE
F01 - SPARE
F02 - SPARE
F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
F13 - CLOSE DECON/PRW VALVE
F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - S/D PFS-COOL-213A Fan B (Note 1) CH 3
P16 - S/D PFS-COOL-213A Fan A (Note 1) CH 3
P15 - S/D PFS-COOL-213B Fan B (Note 1) CH 3
P14 - S/D PFS-COOL-213B Fan A (Note 1) CH 3
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON (Note 1) CH 3
P10 - BKUP CLEAN LIQUOR PMP ON (Note 1) CH 3
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - Bypass carbon filter (Note 1) CH 3
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	LIC 2 TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	B8:011/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	REMARKS	MASK ALARM BIT B001:XX/XX	MASK WORD B8:XX	
72	13 PALL 761	PRIM CHMBR AGENT FEED	5 psig	15 14 07		RCRA/**MACT** AWFCO LIC 05 **/LIC(M)-6.** Enabled when agent feed rate > 500 lb/hr (mask value from AN).	0251/10	232	CH 2
73	13 XY 761A	PRIM CHMBR AGENT VLV A	MALF	15			0263/11	126	
74	13 XY 761B	PRIM CHMBR AGENT VLV B	MALF	15			0270/11	130	
75	13 FAH 763	SEC CHMBR SPENT DECON	**SP+100 lb/hr**			SP from AN code for full-rate processing. ANCDF deleted fuel oil purge inhibit response.	1052/06	**NA**	CH 3
76	13 FAHH 763A	SEC CHMBR SPENT DECON**/PRW**	73 lb/2 min	15 14 07		RCRA/**MACT** AWFCO LIC 11 **/LIC(M)-14** (2 min rolling avg). Alarm added by UMAP668LIC.	1051/02	**38**	CH 2
77	13 FAHH 763C	SEC CHMBR SPENT DECON**/PRW**	2000 lb/hr	15 14 07		RCRA AWFCO LIC 11 and MACT AWFCO LIC(M)-**14** (1 hr rolling avg). Ref: UMAP668LIC and UMUF866LIC. SP to be adjusted periodically to comply with metals/Cl limits.	**1050/02**	**38**	CH 2/3
78	13 FAL 763	SEC CHMBR SPENT DECON/WATER	225 lb/hr			**Time** delay.	1051/06	NA	CH 2
79	13 FALL 763	SEC CHMBR SPENT DECON/WATER	110 lb/hr	16		60 sec delay. At TOCDF, 13-FALL-763 activates the same alarm as 13-FSLL-808, see FAWB Note B-15.	**1022/06**	**102**	CH 2
80	13 PSL 765	SEC CHMBR SPENT DECON/WATER	45 psig	15 14 07 05		RCRA/**MACT** AWFCO LIC 04 **/LIC(M)-5**. Hardwired. Ref: UMAP668LIC. Note: ANCDF SP is 25 psig.	1022/02	**106**	CH 2/3
81	13 XY 766	SEC CHMBR SPENT DECON/WATER	MALF	13 12		ANCDF is adding 'stop agent feed' response.	1061/11	132	
82	13 PSHH 774	SEC CHMBR PILOT GAS	2.75 psig			**Time** delay. **Alarm only.**	0421/02	NA	CH 2/3
83	13 TAH 779	SEC CHMBR REF TEMP	2100°F				1051/04	NA	
84	13 TAH 781	SEC CHMBR GAS TEMP CNTL	(SP+100)°F			SP=setpoint entered in controller by operator	1050/14	NA	
85	13 TAL 781	SEC CHMBR GAS TEMP CNTL	(SP-100)°F			SP=setpoint entered in controller by operator	1050/12	NA	
86	13 TAHH 782	SEC CHMBR EXHAUST GAS	2150°F	15 14 07		RCRA/**MACT** AWFCO LIC 07 **/LIC(M)-9**. Stop feed interlock added by UMAP668LIC.	1052/16	240	CH 2
87	13 TAL 782	SEC CHMBR VENTURI EXH	**1875°F**				1051/12	NA	CH 3
88	13 TALL 782**A**	SEC CHMBR VENTURI EXH	1850°F	15 14 07		MACT AWFCO LIC(M)-**8**. ROHA. Ref: UMUF866LIC.	**1053/02**	**44**	CH 2/3
89	13 TSLL 782	SEC CHMBR VENTURI EXH	1850°F	15 14 07		RCRA/**MACT** AWFCO LIC 06 **/LIC(M)-7**. Ref: UMAP668LIC. Hardwired shutdown of decon feed (i.e., switch to water).	1021/00	32	CH 2
90	13 TSLLL 782	SEC CHMBR VENTURI EXH	1500°F	15 14 07 04		Hardwired open permissive for agent block valves, agent flow control valve, and fuel oil purge block valves.	1020/16	134	CH 2
91	13 FFAH 788	SEC CHMBR COMB AIR	300% EX AIR			Used during ramp-up and ramp-down only	0450/12	NA	

UMCDF LIQUID INCINERATOR (LIC) #2 SYSTEM

UMCDF LIC 2

ALARM AND INTERLOCK MATRIX

UMCDF LIC 2

P&IDs: UM-1-D-546, -547/1, -547/2 and UM-16-D-13; PLCs: ICS-CONR-119; INTERLOCK: I-22

F00 - SPARE
F01 - SPARE
F02 - SPARE
F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
F13 - CLOSE DECON/PRW VALVE
F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - S/D PFS-COOL-213A Fan B (Note 1) CH 3
P16 - S/D PFS-COOL-213A Fan A (Note 1) CH 3
P15 - S/D PFS-COOL-213B Fan B (Note 1) CH 3
P14 - S/D PFS-COOL-213B Fan A (Note 1) CH 3
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON (Note 1) CH 3
P10 - BKUP CLEAN LIQUOR PMP ON (Note 1) CH 3
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - Bypass carbon filter (Note 1) CH 3
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	LIC 2 TAG NUMBER	DESCRIPTION		SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	MASK ALARM BIT B001:XX/XX	MASK WORD B8:XX	
92	13 FFAL 788	SEC CHMBR	COMB AIR	15% EX AIR																X															Used during ramp-up and ramp-down only	0450/10	NA	
93	13 PAH 790	SEC CHMBR	FUEL GAS	3.5 psig																X															Setpoint per 11-1-99 teleconference	0450/02	NA	
94	13 PAL 790	SEC CHMBR	FUEL GAS	2.5 psig																X															Setpoint per 11-1-99 teleconference	0450/00	NA	
95	13 PSLL 791	SEC CHMBR	FUEL GAS	2.0 psig											X																				Hardwired. Ref: UMAP192SRL-R1.	0420/04	NA	
96	13 PSHH 793	SEC CHMBR	FUEL GAS	1.3 psig											X																				Hardwired. Ref: UMAP192SRL-R1.	0420/06	NA	
97	13 PAH 794	SEC CHMBR	PILOT GAS	2.6 psig																X															Setpoint per 11-1-99 teleconference based on 13-PCV-897 set at 2.45 psig (Ref. UMAP192SRL-R1).	0450/06	NA	
98	13 PSLL 795	SEC COMB AIR	DISCHARGE	30 in. wc.			X	X					X		X																				RCRA/**MACT** AWFCO LIC 08 **/LIC(M)-10**. Lockout. Ref: UMAP668LIC. **Hardwired.**	0420/10	**106**	CH 2/3
99	13 FSLL 808	SEC CHMBR	DECON/WATER	**100 lb/hr**		X																													**Time** delay. At TOCDF, 13-FSLL-808 activates the same alarm as 13-FALL-763, see FAWB Note B-15.	1022/06	**102**	CH 2
100	13 PSL 809	DECON/WATER	ATOMIZING AIR	65 psig			X	X					X		X																				RCRA/**MACT** AWFCO LIC 14 **/LIC(M)-17**. Hardwired. Stop feed added by UMAP668LIC.	1022/04	218	CH 2
101	13 PSHH 845	PRIM CHMBR	CHAMBER	-0.25 in. wc.			X	X					X																						RCRA AWFCO LIC 01 and MACT AWFCO LIC(M)-**1**. Ref: UMAP668LIC and UMUF866LIC.	1021/16	136	CH 2
102	13 AISH 850	GAS LEAK	PRIM CHMBR RM	25% LEL			X	X					X																						**Time** delay. Stop feed added by UMAP833PAS (see FAWB Note B-8). Ref: RFI S-ALL-0239.	0220/04	20	CH 2
103	13 AISH 853	GAS LEAK	SEC CHMBR RM	25% LEL			X	X					X																						**Time** delay. Stop feed not shown on P&ID (see FAWB Note B-8). Being added per RFI S-ALL-0239.	0420/14	40	CH 2
104	13 KAL 855	SEC CHMBR	EXHAUST GAS	2.0 sec			X	X					X																							1052/04	52	
105	**13 PDAH 855**	**SEC CHMBR**	**EXHAUST GAS**	**0.5 in. wc.**																**X**																	**1053/06**	**NA**	CH 3
106	13 PDAH**H** 855	SEC CHMBR	EXHAUST GAS	0.6 in. wc.			X	X					X																						RCRA/**MACT** AWFCO LIC 09 **/LIC(M)-11** (instantaneous). Ref: UMAP668LIC and UMUF866LIC.	**1052/02**	56	CH 2/3
107	**13 PDAH 855A**	**SEC CHMBR**	**EXHAUST GAS**	**0.6 in. wc.**			**X**	**X**					**X**																						**MACT AWFCO LIC(M)-12 (ROHA). Ref: UMAP668LIC and UMUF866LIC.**	**1053/04**	**56**	CH 2
108	13 PSHH 882	PRIM CHMBR	PILOT GAS	4.0 psig																															**Time** delay. Ref: UMAP192SRL-R1 for setpoint. **Alarm only.**	0221/06	NA	CH 2/3
109	13 PSHH 896	SEC CHMBR	CHAMBER	-0.25 in. wc.			X	X					X																						RCRA/**MACT** AWFCO LIC 28 **/LIC(M)-30**. Pressure switch added to UM design per letter CPA-1243. SP per UMAP668LIC.	1022/10	**136**	CH 2
110	13 BSLL 908	PRIM CHMBR	BMS SYSTEM	LOCKOUT			X	X					X	**X**																					RCRA/**MACT** AWFCO LIC 30 **/LIC(M)-31**. **Hardwire S/D of Primary furnace through BMS.**	1023/04	48	CH 2/3

UMCDF LIQUID INCINERATOR (LIC) #2 SYSTEM

UMCDF LIC 2

ALARM AND INTERLOCK MATRIX

UMCDF LIC 2

P&IDs: UM-1-D-546, -547/1, -547/2 and UM-16-D-13; PLCs: ICS-CONR-119; INTERLOCK: I-22

F00 - SPARE
F01 - SPARE
F02 - SPARE
F03 - SPARE
F04 - S/D AGENT PUMPS
F05 - LOCKOUT - SECONDARY BURNER
F06 - LOCKOUT - PRIMARY BURNER
F07 - INHIBIT FUEL OIL PURGE OF AGENT LINE
F10 - S/D SEC COMB AIR BLOWER
F11 - S/D PRI COMB AIR BLOWER
F12 - S/D SDS PUMPS
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F14 - STOP DECON FEED/SWITCH TO PRW
F15 - STOP AGENT FEED
F16 - S/D SEC BURNER
F17 - S/D PRI BURNER
MALFUNCTION

P17 - S/D PFS-COOL-213A Fan B (Note 1)
P16 - S/D PFS-COOL-213A Fan A (Note 1)
P15 - S/D PFS-COOL-213B Fan B (Note 1)
P14 - S/D PFS-COOL-213B Fan A (Note 1)
P13 - OPEN QUENCH EMERG. PRW
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON (Note 1)
P10 - BKUP CLEAN LIQUOR PMP ON (Note 1)
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LIQUOR PUMPS
P04 - S/D 1ST & 2ND STAGE ID FAN
P03 - SPARE
P02 - Bypass carbon filter (Note 1)
P01 - S/D 1ST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	LIC 2 TAG NUMBER			DESCRIPTION		SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	MASK ALARM BIT B001:XX/XX	MASK WORD B8:XX
111	13	BSLL	913	SEC CHMBR	BMS SYSTEM	LOCKOUT			X	X					X		X																						RCRA/**MACT** AWFCO LIC 31 **/LIC(M)-32**. **Hardwire S/D of secondary furnace through BMS.**	1023/02	50
112	13	XS	926	BURNER MANAG	LOCAL E-STOP	E-STOP	X	X	X	X					X																									1023/10	60
113	13	PURG	L2	PRIM CHMBR	F.O. PURGE	Complete																																		0221/12	NA
114	28	LAHH	702	OIL-TANK-101	LEVEL HIGH-HIGH	**99%**									**X**																									**3450/02**	**84**
115	28	LALL	702	OIL-TANK-101	LEVEL LOW-LOW	**93%**									**X**																									**3450/00**	**84**
116	28	LSL	702	OIL-TANK-101	LEVEL LOW	3200 gal									**X**																								Hardwired S/D of LIC purge fuel oil pump.	**3420/00**	**84**
117	71	XS	12	EMERGENCY S/D	AT CONS-110	E-STOP	X	X	X	X	X	X	X	X	X			X										X		X							X		**2nd stage at reduced speed.**	1020/00	58
118	71	XS	32	EMERGENCY S/D	AT CONS-112	E-STOP	X	X	X	X	X	X	X	X	X			X										X		X							X		**2nd stage at reduced speed.**	1020/02	58
119	71	XS	52	EMERGENCY S/D	AT CONS-111	E-STOP	X	X	X	X	X	X	X	X	X			X										X		X							X		**2nd stage at reduced speed.**	1020/04	58
120	71	XS	72	EMERGENCY S/D	AT CONS-115	E-STOP	X	X	X	X	X	X	X	X	X			X										X		X							X		**2nd stage at reduced speed.**	1020/06	58
121	71	XS	92	EMERGENCY S/D	AT CONS-116	E-STOP	X	X	X	X	X	X	X	X	X			X										X		X							X		**2nd stage at reduced speed.**	1020/10	58
122	71	XS	142B	EMERGENCY S/D	AT CONS-108	E-STOP	X	X	X	X	X	X	X	X	X			X										X		X							X		**2nd stage at reduced speed.**	1023/00	58
123				BRA TANKS LVL HI-HI / UNAVAILABLE		DICO			X	X					X																								RCRA AWFCO LIC 19. See BRA FAWB for tag #s and setpoints.	B4:23/01	210
124				LIC#2 PAS/PFS NORMAL		NOT NORMAL			X	X					X																								ANCDF deleted all interlocks.	B601/00	**260**

NOTE 1: F05, F06, P02, P10, P11, P13, P14, P15, P16, and P17 responses are not part of the deathwish relay. These responses are included as column headings for presentation clarity.

NOTE 2: The CEMS alarms in the A&I matrix reflect the alarms in approved RFI S-ALL-249, which documents the operation, alarm, interlock requirements, and setpoints for the CEMS non-agent monitors. These requirements were derived from the Code of Federal Regulations (40 CFR, Part 60), site RCRA and air permits, and process requirements. ECP UMAC908MON, R2 has been issed, however, that modifies the CEMS configuration to delete the CEMS immediately after the afterburners and move the RCRA CEMS to after the ID fans. These alarms will be included in the PAS/PFS FAWB, Book 28.

NOTE 3: SRS flow and temperature alarms are not listed because there are numerous discrepancies between the UMCDF design and the expected UMCDF configuration. PMCD has directed that UMCDF implement the final TOCDF LIC SRS configuration, however, the UMCDF design still reflects the original TOCDF configuration and has not been revised to reflect the numerous changes that TOCDF has made. The remaining SRS alarms will be added to the A&I matrix when the UMCDF SC has established the SRS configuration.

NOTE **4**: Agent/surrogate feed rate alarm setpoints are: Surrogate 1160 lb/hr, 42 lb/2 min**, 197 lb/10 min**; VX 680 lb/hr, 24 lb/2 min**, 115 lb/10 min**; GB 1030 lb/hr, 37 lb/2 min**, 175 lb/10 min**; HD 1305 lb/hr, 47 lb/2 min**, 221 lb/10 min**. Interlocks were added for 13-FAHH-731C/731D by UMAP668LIC and for 13-FAHH-731 by UMUF866LIC.

APPENDIX D

PLC Automatic Control Sequences

Appendix D contains a summary of PLC automatic control sequences based on the current versions of the PLC code for each of the sites. This appendix also includes descriptions of the burner management system (BMS) circuit logic for the LIC furnaces.

The PLC automatic control sequence summaries were generated based on the control system rung ladders in the PLC code for the LIC furnaces. The operator interface with the PLCs, the Advisor PC system, stores device information in a database that consists of *tags*, or database records used for storing all necessary information related to a device that is monitored or controlled by the Advisor PC system. **D6** tags are used for discrete devices that may be controlled from the Control Room. In this appendix, automatic control for all devices with **D6** tags are described, grouped by the Advisor PC screens on which they appear. Details related to **D6** device format can be found in the CSDP Control Systems Software Design Guide. Note that Advisor PC tag numbers may not match P&ID tag numbers exactly since Advisor PC tag numbers are labels in the code that refer to a device that may be more encompassing than the P&ID device.

Because the LIC PLC automatic control sequences are similar for all four sites, the control sequences are listed in a single table for each screen (Tables D.2 through D.5) with annotations in the description for each device that indicate the differences, if any, between the control for the device at the different sites. In addition, if control sequence differences exist between the 2 LIC furnaces at TOCDF or UMCDF, these differences also will be noted. Similarly, the BMS control logic summaries are listed in a single table (Table D.6) with annotations indicating any site-specific differences.

D.1 LIC Furnace PLC Automatic Control Sequences

Specific site code currently exists for *ANCDF and* TOCDF. The Equipment Installation Contractor (EIC) is developing site-specific code for PBCDF and UMCDF. At TOCDF, control for LIC 1 is provided by ICS-CONR-114 and control for LIC 2 is provided by ICS-CONR-119. *Control for the ANCDF LIC is provided by ICS-CONR-114.* Control logic for analogous devices for each of the two LIC furnaces are listed in Tables D.2 through D.5 with the LIC 2 device identifiers (e.g., tag numbers, component numbers) enclosed in brackets []. *The ANCDF LIC uses the device identifiers for LIC 2.* The information in the tables is based on the *ANCDF and* TOCDF control system rung ladders as of *January 2000 and February 2000, respectively*.

At TOCDF, each LIC furnace system has eleven Advisor PC screens associated with its operation. Six of the screens are associated with LIC PAS operation of the LIC PAS. *The ANCDF LIC has thirteen Advisor PC screens associated with its operation. Eight of the screens are associated with LIC PAS/PFS operation*. Control sequences associated with *the*

TOCDF PAS screens and the ANCDF PAS/PFS screens are described in the PAS/PFS programmatic process FAWB, Book 28. The five screens described in this appendix for *the ANCDF and TOCDF* LIC furnace systems are listed in Table D.1.

Table D.1 LIC Furnace System Advisor PC Screens

Advisor PC Screen Name	Process Screen Designation
LIC Furnace #1 [#2], Primary Burner	L1P [L2P]
LIC Furnace #1 [#2], Secondary Burner	L1S [L2S]
LIC Furnace #1 [#2]	LF1 [LF2]
LIC Slag Removal System	ST1 [ST2]
LIC Slag Removal System	SR1 [SR2]

Table D.2. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences
Advisor PC Screen: **L1P [L2P]**

Device:	**LIC-BLOW-101 [LIC-BLOW-201] LIC Primary Chamber Combustion Air Blower**
Advisor PC Tag:	X13BLW101 [X13BLW201]
CONR:	C114 [C119]
Driver Word:	0260 [0260]
Driver Type:	1
Auto start:	The CA blower will automatically start if either of the following conditions are satisfied: • LIC #1 [LIC #2] PAS is normal (see below) • Auto start relay is active and the CA blower is running **Note: Once the CA blower has automatically started, LIC #1 [LIC #2] PAS not normal will not shut down the CA blower.**
I-LOCK:	The following conditions must be satisfied to allow the CA blower to operate: • 13-FV-042 [13-FV-743] at low fire, or 13-BLOW-101 [13-BLOW-201] running (combustion air damper must be at low fire for start up) • LIC#1 [LIC #2] Primary Combustion Air Blower Deathwish relay not active (see A&I matrix))
Relay:	**LIC#1 [LIC #2] PAS Normal**[1] The LIC#1 [LIC #2] PAS normal relay will be energized if all of the following conditions are satisfied: • LIC clean liquor pump running (PAS-PUMP-113/-114) [(PAS-PUMP-213/-214)]

[1] *PAS Normal conditions in Table D.2 reflect the Feb 2000 TOCDF and Jan 2000 ANCDF code. The ANCDF code did not yet reflect changes in the PAS Normal relay expected to be incorporated for PFS sites. Table D.2 will be modified in a future revision to show the revised code for PFS sites. PAS/PFS normal conditions for PFS sites are currently defined in the PAS/PFS FAWB.*

Table D.2. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **L1P [L2P]**	
	• LIC quench brine pump running (PAS-PUMP-111/-112) [(PAS-PUMP-211/-212)] • 24-LSHH-114 [24-LSHH-819 *at TE, 24-LSHHH-819 at AN*] Scrubber sump level alarm HI HI not active, or 24-LAH-115 [24-LAH-818] Scrubber sump level alarm HI not active • 24-LSLL-099 [24-LSLL-820 *at TE, 24-LSLLL-820 at AN*] Scrubber sump level alarm LO LO not active, or 24-LAL-115 [24-LAL-818] Scrubber sump level alarm LO not active • 24-LAHH-132 [24-LAHH-810] Quench tower level alarm HI HI not active • 24-TSHHH-396 [24-TSHHH-817] Quench tower exhaust temperature alarm HI HI HI not active • 24-LSHH-146 [24-LSHH-866] Mist Eliminator level alarm HI HI not active with LIC #1 [LIC #2] Mist Eliminator selected by 24-HS-143 [24-HS-864] • 24-LSHH-163 Spare mist eliminator sump level alarm HI HI not active with spare mist eliminator selected by 24-HS-143 [24-HS-864] • Either stage of the ID fan running
Device:	**LIC-FURN-101 [LIC-FURN-201] LIC Atomizing Air Valve, 13-XV-126A [13-XV-735A] (Medium Pressure)** **(See FAWB Note B-10)**
Advisor PC Tag:	X13XV126A [X13XV735A]
CONR:	C114 [C119]
Driver Word:	0261 [0261]
Driver Type:	4
Auto open:	None. There is no software generated automatic open condition for this valve.
I-LOCK:	The following conditions must be satisfied to allow the valve to open [in the *Feb 2000* TOCDF code, this I-lock existed on LIC 1 only]: • Start agent feed driver is not active • Start fuel oil purge driver is not active
Device:	**LIC-FURN-101 [LIC-FURN-201] LIC Atomizing Air Valve, 13-XV-126B [13-XV-735B] (High Pressure)**
Advisor PC Tag:	X13XV126B [X13XV735B]
CONR:	C114 [C119]
Driver Word:	0262 [0262]
Driver Type:	4
Auto open:	The valve will automatically open if the following conditions are satisfied: • LIC-FURN-101 [LIC-FURN-201] Primary Burner start driver is active • Excess air mode is enabled (Note: valve remains open for 5 seconds after excess air mode is disabled)
I-LOCK:	None. There are no software interlocks for this valve.

Table D.2. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences
Advisor PC Screen: **L1P [L2P]**

Device:	**LIC-FURN-101 [LIC-FURN-201] LIC Atomizing Air Valve, 13-XV-126C [13-XV-735C](Low Pressure)**
Advisor PC Tag:	X13XV126C [X13XV735C]
CONR:	C114 [C119]
Driver Word:	0265 [0265]
Driver Type:	4
Auto open:	The valve will automatically open if the following conditions are satisfied: • LIC-FURN-101 [LIC-FURN-201] Primary Burner start driver is active • Excess air mode is not enabled for 5 seconds (Note: valve remains open for 5 seconds after excess air is enabled)
I-LOCK:	None. There are no software interlocks for this valve
Device:	**13-XV-135 [13-XV-758] LIC Agent Line Air Purge Block Valve**
Advisor PC Tag:	X13XV135 [X13XV758]
CONR:	C114 [C119]
Driver Word:	0267 [0267]
Driver Type:	3
Auto open:	13-XV-135 [13-XV-758] will automatically open for the first 60 seconds following the closure of both 13-XV-134A/B [13-XV-761A/B] (agent feed block valves).
I-LOCK:	The following conditions must be satisfied to allow the valve to open: • 13-XV-134A [13-XV-761A] closed • 13-XV-134B [13-XV-761B] closed • 13-XV-105A [13-XV-205A *at TE, 13-XV-726A at AN*] (oil to agent purge) closed • 13-XV-105B [13-XV-205B *at TE, 13-XV-726B at AN*] (oil to agent purge) closed • 13-XV-104 [13-XV-204] open
Device:	**LIC-FURN-101 [LIC-FURN-201] LIC Primary Chamber Burner**
Advisor PC Tag:	X13HS916 [X13HS902]
CONR:	C114 [C119]
Driver Word:	0268 [0268]
Driver Type:	4 (manual mode only)
Auto start:	N/A
I-LOCK:	The following conditions must be satisfied to allow the burner to operate: • LIC#1 [LIC #2] PAS Normal or I-Lock satisfied (latch the I-Lock so that once it is established, PAS not normal will not shutdown the burner) • LIC#1 [LIC #2] Primary Burner Deathwish relay not active (see A&I matrix)

Table D.2. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences
Advisor PC Screen: **L1P [L2P]**

Device:	**LIC-FURN-101 [LIC-FURN-201] LIC Primary Chamber Burner Lockout Remote Reset**
Advisor PC Tag:	X13HS919 [X13HS905]
CONR:	C114 [C119]
Driver Word:	0269 [0269]
Driver Type:	4 (manual mode only)
Auto start:	N/A
I-LOCK:	None. There are no software interlocks inhibiting the remote reset of a burner lockout. If the burner lockout alarm is active on L1P [L2P], the CRO presses 'F9' and the remote reset will be energized for 3 seconds.
Device:	**13-XV-134 [13-XV-761] Agent Feed Icon**
Advisor PC Tag:	X13HS134 [L2PAGFEED]
CONR:	C114 [C119]
Driver Word:	0271 [0271]
Driver Type:	N/A This is the agent feed icon on the L1P [L2P] control screen. If the I-Lock is satisfied, and the CON operator selects the icon and presses the 'start' key, the agent feed driver is activated. The agent feed driver is used throughout the logic for various control schemes, most notably, the agent block valve permissive to the BMS relay.
Auto Open:	N/A
I-LOCK:	The agent feed driver will be inhibited unless all of the following conditions are satisfied: • LIC-FURN-101 [LIC-FURN-201] burner has been released to automatic PLC control by the BMS for 60 minutes • LIC-FURN-102 [LIC-FURN-202] burner has been released to automatic PLC control by the BMS • Agent feed deathwish relay is not active (see A&I matrix) • Excess air mode enabled • 13-XV-134A/B [13-XV-761A/B] both open, or 13-FCV-127 [13-FCV-731] full closed • 13-XV-135 [13-XV-758] (air to agent purge) closed • 13-XV-105A/B [13-XV-205A/B *at TE, 13-XV-726A/B at AN*] (oil to agent purge) closed • 13-XV-104 [13-XV-204] (common block valve) open • 13-XV-367 [13-XV-567] (slide gate) closed • *(TE only)* 24-XV-750 [24-XV-753] (bleed air) closed
Device:	**13-FY-9980 [9985] Vortex Cooling Air**
Advisor PC Tag:	X13FY9980 [X13FY9985 *at TE, X13FY750 at AN*]
CONR:	C114 [C119]
Driver Word:	0272 [0272]
Driver Type:	4
Auto Open:	The valve will automatically open if the following condition is active: • Primary chamber refractory (13-TIC-125) [(13-TIC-754)] is greater than 500°F

Table D.2. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **L1P [L2P]**

I-LOCK:	None. There are no software interlocks for this valve.
Device:	**13-HS-100A [13-HS-100B] Fuel Oil Purge Icon**
Advisor PC Tag:	L1PFOFEED [L2PFOFEED]
CONR:	C114 [C119]
Driver Word:	0273 [0273]
Driver Type:	N/A
	This is the fuel oil purge icon on the L1P [L2P] control screen. If the I-Lock is satisfied, and the CON operator selects the icon and presses the 'start' key, the fuel oil purge driver is activated. The fuel oil purge driver is used throughout the logic for various control schemes, most notably, the fuel oil block valve permissive to the BMS.
Auto Open:	N/A
I-LOCK:	The fuel oil purge driver will be inhibited unless all of the following conditions are satisfied[2]: • *(AN only) Fuel Oil Purge Complete relay is not active (see below)* • LIC-FURN-101 [LIC-FURN-201] burner has been released to automatic PLC control by the BMS for 60 minutes • LIC-FURN-102 [LIC-FURN-202] burner has been released to automatic PLC control by the BMS • Fuel oil purge deathwish relay is not active (see A&I matrix) • 13-XV-135 [13-XV-758] (air to agent purge) closed, or fuel oil purge driver is active and, *at TE only,* fuel oil purge is complete (see below) • 13-XV-104 [13-XV-204] (common block valve) open • 13-XV-367 [13-XV-567] (SRS slide gate) closed
Relay:	***(TE Only)* Fuel Oil Purge Complete** The fuel oil purge complete relay will be latched to the active state if all of the following conditions are satisfied: • 13-XV-105A/B [13-XV-205A/B] (fuel oil block valves) *not* both closed • Fuel Oil Purge Cycle Timer (T0635, 1 hour) is expired • 13-FQI-720A indicates greater than or equal to 60 gallons • Fuel Oil Purge driver is active The fuel oil purge complete relay will be unlatched to the inactive state if all of the following conditions are satisfied: • *"Post fuel oil" air purge timer (20 min) is expired* • CON operator selects the fuel oil purge icon and issues a manual stop command

[2] *At a Sept 2000 ANCDF LIC review meeting, ANCDF decided to add two interlocks to the fuel oil purge driver: 1) agent block valves 13-XV-761A/761B closed, and 2) excess air enabled. These interlocks will be added to a future version of the ANCDF PLC code.*

Table D.2. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **L1P [L2P]**	
Relay:	***(AN Only) Fuel Oil Purge Complete*** *The fuel oil purge complete relay is active if either of the following conditions are satisfied:* • *Fuel oil purge driver is active AND Fuel Oil Purge Cycle Timer (T0635, 1 hour) is expired AND 13-FQI-720A indicates greater than or equal to 60 gallons* • *Reset fuel oil purge total flow integrator relay (see below) is not active AND the fuel oil purge is complete (seal-in)* *The reset fuel oil purge total flow integrator relay is active if all of the following conditions are satisfied:* • *"Post fuel oil" air purge timer (20 min) is expired* • *CON operator selects the fuel oil purge icon and issues a manual stop command*
Relay:	***(AN Only) Fuel Oil Purge Complete*** *The fuel oil purge complete relay is latched to the active state if all of the following conditions are satisfied:* • *Fuel Oil Purge driver is active* • *13-XV-762A/B (fuel oil block valves) are not both closed* • *Fuel Oil Purge Cycle Timer (T0635, 1 hour) is expired* • *13-FQI-720A indicates ³ 60 gallons* *The fuel oil purge is complete relay is unlatched from the active state if all of the following conditions are satisfied:* • *"Post fuel oil" air purge timer (20 min) is expired* • *CON operator selects the fuel oil purge icon and issues a manual stop command*
Device:	**LIC #1 [LIC #2] Excess Air Mode Icon**
Advisor PC Tag:	L1PEXAIR [ ]
CONR:	C114 [C119]
Driver Word:	0276 [0276]
Driver Type:	N/A (manual control only) This icon enables the CON operator to place LIC#1 in excess air mode to ensure proper combustion air configuration to enable the permissives required for the admission of feed. If the I-Lock is satisfied, the CON operator issues a manual start command to enable excess air mode. The excess air icon will indicate excess air mode enabled when the driver is active.
Auto Open:	N/A
I-LOCK:	The PLC will not enable excess air mode unless all of the following conditions are satisfied: • LIC-FURN-101 [LIC-FURN-201] burner has been released to automatic PLC control by the BMS for 60 minutes • LIC-FURN-102 [LIC-FURN-202] burner has been released to automatic PLC control by the BMS • LIC#1 Primary Chamber exhaust gas temperature (13-TIC-043) [(13-TIC-752)] is at least 215 deg F.

Table D.3. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences
Advisor PC Screen: **L1S [L2S]**

Device:	**LIC-BLOW-102 [LIC-BLOW-202] LIC Secondary Chamber Combustion Air Blower**
Advisor PC Tag:	X13BLW102 [X13BLW202]
CONR:	C114 (C119)
Driver Word:	0460 [0460]
Driver Type:	1
Auto start:	The CA blower will automatically start if either of the following conditions are satisfied: • LIC #1 PAS [LIC#2 PAS] is normal • Auto start relay is active and the CA blower is running **Note: Once the CA blower has automatically started, LIC #1 PAS [LIC#2 PAS] not normal will not shut down the CA blower.**
I-LOCK:	The following conditions must be satisfied to allow the CA blower to operate: • 13-FV-050 [13-FV-788] at low fire, or 13-BLOW-102 [13-BLOW-202] running (combustion air damper must be at low fire for start up) • LIC#1 [LIC#2] Secondary Combustion Air Blower Deathwish relay not active (see A&I matrix)
Device:	**LIC-FURN-102 [LIC-FURN-202] LIC Secondary Chamber Burner**
Advisor PC Tag:	X13HS903 [X13HS917]
CONR:	C114 [C119]
Driver Word:	0464 [0464]
Driver Type:	4 (manual mode only)
Auto start:	N/A
I-LOCK:	The following conditions must be satisfied to allow the burner to operate: • LIC#1 [LIC #2] Secondary Burner Deathwish relay not active (see A&I matrix)
Device:	**LIC-FURN-102 [LIC-FURN-202] LIC Secondary Chamber Burner Lockout Remote Reset**
Advisor PC Tag:	X13HS906 [X13HS920]
CONR:	C114 [C119]
Driver Word:	0465 [0465]
Driver Type:	4 (manual mode only)
Auto start:	N/A
I-LOCK:	None. There are no software interlocks inhibiting the remote reset of a burner lockout. If the burner lockout alarm is active on L1S [L2S], the CRO presses ‘F9' and the remote reset will be energized for 3 seconds.

Table D.4. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences
Advisor PC Screen: **LF1 [LF2]**

Device:	**13-XV-062 [13-XV-768] LIC Secondary Chamber Decon/Water Nozzle Atomizing Air Block Valve**
Advisor PC Tag:	X13XY062 [X134XY768]
CONR:	C114 [C119]
Driver Word:	1060 [1060]
Driver Type:	4
Auto open:	13-XV-062 [13-XV-768] will automatically open if LIC#1 [LIC #2] secondary chamber combustion air blower is running.
I-LOCK:	None. There are no software interlocks for this valve
Device:	**13-XV-099 [13-XV-766] LIC Secondary Chamber Decon/Water Nozzle Block Valve**
Advisor PC Tag:	X13XY099 [X13XY766]
CONR:	C114 [C119]
Driver Word:	1061 [1061]
Driver Type:	3
Auto open:	13-XV-099 [13-XV-766] will automatically open if LIC#1 [LIC #2] secondary chamber combustion air blower is running.
I-LOCK:	The following conditions must be satisfied to allow the valve to open: • 13-TIC-103 [13-TIC-781], secondary chamber gas temperature, is greater than 1500 deg F, or 13-XV-099 [13-XV-766] I-Lock is satisfied and 13-TIC-103 [13-TIC-781] is greater than 1430 deg F (this will latch the I-Lock to allow for cooldown once the air and water block valves are open). • No active CON LIC#1 [LIC #2] E-stops (13-XS-002, 022, 042, 062, or 082) [(13-XS-012, 032, 052, 072 or 092)] • 13-XV-099 [13-XV-766] deathwish relay is not active (see A&I matrix)
Device:	**13-XV-106 [13-XV-772] LIC Air Bypass Extended Idle Block Valve**
Advisor PC Tag:	X13XV106 [X13XV772]
CONR:	C114 [C119]
Driver Word:	1063 [1063]
Driver Type:	4
Auto open:	None. There is no software generated automatic open condition for this valve.
I-LOCK:	None. There are no software interlocks for this valve
Device:	**13-XV-102A [13-XV-762A] Decon/Water 3-Way Valve**
Advisor PC Tag:	X11XY102A [X11XY762A]
CONR:	C114 [C119]
Driver Word:	1064 [1064]
Driver Type:	3
Auto Open:	Spent Decon Feed Icon driver relay is active.

Table D.4. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **LF1 [LF2]**

I-LOCK:	The 3-way valve will be inhibited from opening to decon unless all of the following conditions are satisfied: • LIC-FURN-102 [LIC-FURN-202] burner has been released to automatic PLC control by the BMS for 10 seconds • Decon feed deathwish relay is not active (see A&I matrix) • 13-XV-367 (slide gate) closed *[13-XV-567 at AN,* this I-lock was not in the *Feb 2000* TOCDF LIC 2 code*]* • DICO from CONR106 indicating that the spent decon system is ready to feed (see below)
Relay:	**Spent Decon System Ready DICO** CONR106 will issue "Spent Decon System Ready DICO" to CONR114 [CONR119] if all of the following conditions are satisfied: • The open I-Lock for any of the three tank drain valves is satisfied • Either SDS-PUMP-171 [SDS-PUMP-271] or SDS-PUMP-172 is running • TOX HVAC is normal • 10 second timer (enabled on the above) is expired
BMS Permissives:	Once the 13-XV-102A [13-XV-762A] Decon/Water 3-Way Valve open driver is active, the BMS (rev. 11, 3/28/95) will open the three-way valve to decon if the following conditions are satisfied: • Secondary Burner is firing on main fuel (Fireye contact #7) • 13-TSLL-129 [*13-TSLL-782*] is not active • Primary Burner is firing on main fuel (Fireye contact #7)
Device:	**13-XV-102A [13-XV-762A] Decon Feed Icon**
Advisor PC Tag:	X13HS102A [X13HS763A]
CONR:	C114 [C119]
Driver Word:	1065 [1065]
Driver Type:	4 (manual only) This is the decon feed icon on the LF1 [LF2] control screen. If the I-Lock is satisfied, and the CON operator selects the icon and presses the 'start' key, the decon feed driver is activated. The decon feed driver is used throughout the logic for various control schemes, most notably, the DICO to CONR106 to start the spent decon feed pump, and the auto open relay for the 3-way valve to position to allow decon flow.
Auto Open:	N/A
I-LOCK:	The decon feed driver will be inhibited unless all of the following conditions are satisfied: • LIC-FURN-102 [LIC-FURN-202] burner has been released to automatic PLC control by the BMS for 10 seconds • Decon feed deathwish relay is not active (see A&I matrix) • 13-XV-367 (slide gate) closed (LIC #1 only) [*13-XV-567 at AN, this I-lock was not in the FEB 2000 TOCDF LIC 2 code*]

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences
Advisor PC Screen: **SR1 [SR2]**

Device:	**LIC-CNVX-101 [LIC-CNVX-201] Slag Removal Conveyor #1**
Advisor PC Tag:	S13HS301 [S13HS501]
CONR:	C114 [C119]
Driver Word:	2660 [2660]
Driver Type:	7 (without warning horn)
Auto Forward:	This device will automatically run in the forward direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver • LIC #1 [LIC #2] Slag Load Drum to LIC-CNVX-107 [LIC-CNVX-207] manual start command • LIC #1 [LIC #2] Slag Load Drum to LIC-CNVX-107 [LIC-CNVX-207] "OK to Load" *Note: Once established the auto forward relay remains latched until any of the following are satisfied:* • *LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver not active* • *13-ZS-310B [13-ZS-510B] LIC-CNVX-102 [LIC-CNVX-202] barrel present* • *LIC #1 [LIC #2] Slag Load Drum to LIC-CNVX-107 [LIC-CNVX-207] manual stop command*
Auto Reverse:	This device will automatically run in the reverse direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver • LIC-DOOR-101 [LIC-DOOR-201] airlock outer door open • 13-ZS-310A [13-ZS-510A] LIC-CNVX-102 [LIC-CNVX-202] barrel present Note: Once established, the auto reverse relay remains latched until *any of the following are satisfied:* • *LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver not active* • 13-ZS-309B [13-ZS-509B] LIC-CNVX-101 [LIC-CNVX-201] barrel present relay is energized.
Forward I-Lock:	This device is interlocked from moving in the forward direction unless all of the following are satisfied: • {13-ZS-309B [13-ZS-509B] LIC-CNVX-101 [LIC-CNVX-201] barrel present not active} OR {13-ZS-304A [13-ZS-504A] LIC-DOOR-101 [LIC-DOOR-201] airlock outer door open, 13-ZS-309B [13-ZS-509B] LIC-CNVX-101 [LIC-CNVX-201] barrel present, LIC-CNVX-102 [LIC-CNVX-202] slag removal conveyor running forward}

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**

- 13-XS-300A/B [13-XS-500A/B] LIC-CNVX-101 [LIC-CNVX-201] slag removal rope switch not pulled
- CON E-stop not active

Reverse I-Lock: This device is interlocked from moving in the reverse direction unless all of the following are satisfied:

- 13-XS-300A/B [13-XS-500A/B] LIC-CNVX-101 [LIC-CNVX-201] slag removal rope switch not pulled
- 13-ZS-309A [13-ZS-509A] LIC-CNVX-101 [LIC-CNVX-201] barrel present not active
- CON E-stop not active

Device: **LIC-DOOR-101 [LIC-DOOR-201] Airlock Outer Door**
Advisor PC Tag: S13HS303 [S13HS503]
CONR: C114 [C119]
Driver Word: 2661 [2661]
Driver Type: 8
Auto Open: This device will automatically open if the following logic is satisfied:

- LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver AND 13-ZS-309B [13-ZS-509B] LIC-CNVX-101 [LIC-CNVX-201] barrel present

OR

- LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver AND 13-ZS-310A [13-ZS-510A] LIC-CNVX-102 [LIC-CNVX-202] barrel present

Note: Once established, the auto open relay remains latched until any of the following are satisfied:

- LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver active AND 13-ZS-310B [13-ZS-510B] LIC-CNVX-102 [LIC-CNVX-202] barrel present
- LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver active AND 13-ZS-309B [13-ZS-509B] LIC-CNVX-101 [LIC-CNVX-201] barrel present - trailing edge
- LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver not active AND LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver not active

Auto Close: This device will automatically close if all of the following logic is satisfied:

- LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver is active OR LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver is active
- LIC-DOOR-101 [LIC-DOOR-201] airlock outer door auto open relay not active

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**	
Open I-Lock:	This device is interlocked from opening unless all of the following are satisfied: • 13-ZS-305B [13-ZS-505B] LIC-DOOR-102 [LIC-DOOR-202] airlock inner door closed • CON E-stop not active
Close I-Lock:	This device is interlocked from close unless the following is satisfied: • CON E-stop not active
Device:	**LIC-CNVX-102 [LIC-CNVX-202] Slag Removal Conveyor #2**
Advisor PC Tag:	S13HS306 [S13HS506]
CONR:	C114 [C119]
Driver Word:	2662 [2662]
Driver Type:	7 (without warning horn)
Auto Forward:	This device will automatically run in the forward direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver AND • 13-ZS-309B [13-ZS-509B] LIC-CNVX-101 [LIC-CNVX-201] barrel present AND LIC-DOOR-101 [LIC-DOOR-201] airlock outer door open OR • 13-ZS-310B [13-ZS-510B] LIC-CNVX-102 [LIC-CNVX-202] barrel present AND LIC-DOOR-102 [LIC-DOOR-202] airlock inner door open Note: Once established, the auto forward relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver is not active • LIC-DOOR-101 [LIC-DOOR-201] airlock outer door open AND 13-ZS-310B [13-ZS-510B] LIC-CNVX-102 [LIC-CNVX-202] barrel present • LIC-DOOR-102 [LIC-DOOR-202] airlock inner door open AND 13-ZS-349 [13-ZS-549] LIC-CNVX-103 [LIC-CNVX-203] barrel present
Auto Reverse:	This device will automatically run in the reverse direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver AND • 13-ZS-310A [13-ZS-510B] LIC-CNVX-102 [LIC-CNVX-202] barrel present AND LIC-DOOR-101 [LIC-DOOR-201] airlock outer door open OR

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**

	• 13-ZS-349 [13-ZS-549] LIC-CNVX-103 [LIC-CNVX-203] barrel present AND LIC-DOOR-102 [LIC-DOOR-202] airlock inner door open Note: Once established, the auto reverse relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver is not active • LIC-DOOR-102 [LIC-DOOR-202] airlock inner door open AND 13-ZS-310A [13-ZS-510A] LIC-CNVX-102 [LIC-CNVX-202] barrel present • LIC-DOOR-101 [LIC-DOOR-201] airlock outer door open AND 13-ZS-309B [13-ZS-509B] LIC-CNVX-101 [LIC-CNVX-201] barrel present - trailing edge
Forward I-Lock:	This device is interlocked from moving in the forward direction unless all of the following are satisfied: • {13-ZS-310B [13-ZS-510B] LIC-CNVX-102 [LIC-CNVX-202] barrel present not active} OR {13-ZS-305A [13-ZS-505A] LIC-DOOR-102 [LIC-DOOR-202] airlock inner door open, 13-ZS-310B [13-ZS-510B] LIC-CNVX-102 [LIC-CNVX-202] barrel present, LIC-CNVX-103 [LIC-CNVX-203] lift #1 conveyor running forward, 13-ZS-315A [13-ZS-515A] LIC-HYPU-101 [LIC-HYPU-201] Lift #1 raised} • CON E-stop not active
Reverse I-Lock:	This device is interlocked from moving in the reverse direction unless all of the following are satisfied: • {13-ZS-310A [13-ZS-510A] LIC-CNVX-102 [LIC-CNVX-202] barrel present not active} OR • {13-ZS-304A [13-ZS-504A] LIC-DOOR-101 [LIC-DOOR-201] airlock outer door open, 13-ZS-310A [13-ZS-510A] LIC-CNVX-102 [LIC-CNVX-202] barrel present, LIC-CNVX-101 [LIC-CNVX-201] slag removal conveyor running forward} • CON E-stop not active
Device:	**LIC-DOOR-102 [LIC-DOOR-202] Airlock Inner Door**
Advisor PC Tag:	S13HS308 [S13HS508]
CONR:	C114 [C119]
Driver Word:	2663 [2663]
Driver Type:	8
Auto Open:	This device will automatically open if the following logic is satisfied: • 13-ZS-315A [13-ZS-515A] LIC-HYPU-101 [LIC-HYPU-201] Lift #1 raised AND

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**

	• LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver AND 13-ZS-310B [13-ZS-510B] LIC-CNVX-102 [LIC-CNVX-202] barrel present OR • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver AND 13-ZS-349 [13-ZS-549] LIC-CNVX-103 [LIC-CNVX-203] barrel present Note: Once established, the auto open relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver active AND 13-ZS-349 [13-ZS-549] LIC-CNVX-103 [LIC-CNVX-203] barrel present • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver active AND 13-ZS-310A [13-ZS-510A] LIC-CNVX-102 [LIC-CNVX-202] barrel present • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver not active AND LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver not active • 13-ZS-315A [13-ZS-515A] LIC-HYPU-101 [LIC-HYPU-201] Lift #1 not raised
Auto Close:	This device will automatically close if all of the following logic is satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver is active OR LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver is active • LIC-DOOR-102 [LIC-DOOR-202] airlock inner door auto open relay not active
Open I-Lock:	This device is interlocked from opening unless all of the following are satisfied: • 13-ZS-304B [13-ZS-504B] LIC-DOOR-101 [LIC-DOOR-201] airlock outer door closed • CON E-stop not active • 13-ZS-315A [13-ZS-515A] LIC-HYPU-101 [LIC-HYPU-201] Lift #1 raised
Close I-Lock:	This device is interlocked from closing unless the following is satisfied: • CON E-stop not active
Device:	**LIC-HYPU-101 [LIC-HYPU-201] Slag Removal Lift #1**
Advisor PC Tag:	S13HS314 [S13HS514]
CONR:	C114 [C119]
Driver Word:	2664 [2664]
Driver Type:	8
Auto Raise:	This device will automatically raise if the following logic is satisfied: • 13-ZS-315A [13-ZS-515A] LIC-HYPU-101 [LIC-HYPU-201] Lift #1 is not raised

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**

	AND • LIC #1 [LIC #2] slag load drum to LIC-CNVX-107 [LIC-CNVX-207] manual start command is active AND LIC #1 [LIC #2] slag load drum to LIC-CNVX-107 [LIC-CNVX-207] is OK to load OR 13-ZS-356 [13-ZS-556] LIC-CNVX-104 [LIC-CNVX-204] barrel present AND LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver active OR • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver AND 13-ZS-349 [13-ZS-549] LIC-CNVX-103 [LIC-CNVX-203] barrel present Note: Once established, the auto raise relay remains latched until any of the following are satisfied: • 13-ZS-315A [13-ZS-515A] LIC-HYPU-101 [LIC-HYPU-201] Lift #1 raised • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver not active AND LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver not active
Auto Lower:	This device will automatically lower if the following logic is satisfied: • 13-ZS-315A [13-ZS-515A] LIC-HYPU-101 [LIC-HYPU-201] Lift #1 is not lowered AND • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver active AND 13-ZS-349 [13-ZS-549] LIC-CNVX-103 [LIC-CNVX-203] barrel present OR LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver active AND 13-ZS-310A [13-ZS-510A] LIC-CNVX-102 [LIC-CNVX-202] barrel present OR {LIC#1 [LIC #2] slag unload drum to end conveyor manual start command is active AND LIC #1 [LIC #2] slag unload drum to end conveyor is OK to unload} Note: Once established, the auto lower relay remains latched until any of the following are satisfied: • 13-ZS-315A [13-ZS-515A] LIC-HYPU-101 [LIC-HYPU-201] Lift #1 lowered • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver not active AND LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver not active
Raise I-Lock:	This device is interlocked from raising unless all of the following are satisfied: • LIC-CNVX-103 [LIC-CNVX-203] slag removal lift #1 conveyor not running forward • LIC-CNVX-103 [LIC-CNVX-203] slag removal lift #1 conveyor not running reverse • CON E-stop not active

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**	
Lower I-Lock:	This device is interlocked from lowering unless the following are satisfied: • LIC-CNVX-103 [LIC-CNVX-203] slag removal lift #1 conveyor not running forward • LIC-CNVX-103 [LIC-CNVX-203] slag removal lift #1 conveyor not running reverse • CON E-stop not active • 13-ZS-305B LIC-DOOR-102 [LIC-DOOR-202] airlock inner door closed
Device:	**LIC-CNVX-103 [LIC-CNVX-203] Slag Removal Lift #1 Conveyor**
Advisor PC Tag:	S13HS312 [S13HS512]
CONR:	C114 [C119]
Driver Word:	2665 [2665]
Driver Type:	7 (without warning horn)
Auto Forward:	This device will automatically run in the forward direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver AND • 13-ZS-349 [13-ZS-549] LIC-CNVX-103 [LIC-CNVX-203] barrel not present AND LIC-DOOR-102 [LIC-DOOR-202] airlock inner door open AND 13-ZS-315A [13-ZS-515A] LIC-HYPU-101 [LIC-HYPU-201] Lift #1 is raised OR • 13-ZS-349 [13-ZS-549] LIC-CNVX-103 [LIC-CNVX-203] barrel present AND 13-ZS-356 [13-ZS-556] LIC-CNVX-104 [LIC-CNVX-204] barrel not present AND 13-ZS-315B [13-ZS-515B] LIC-HYPU-101 [LIC-HYPU-201] Lift #1 is lowered Note: Once established, the auto forward relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver is not active • 13-ZS-349 [13-ZS-549] LIC-CNVX-103 [LIC-CNVX-203] barrel present AND 13-ZS-315A [13-ZS-515A] LIC-HYPU-101 [LIC-HYPU-201] Lift #1 is raised • 13-ZS-356 [13-ZS-556] LIC-CNVX-104 [LIC-CNVX-204] barrel present AND 13-ZS-315B [13-ZS-515B] LIC-HYPU-101 [LIC-HYPU-201] Lift #1 is lowered
Auto Reverse:	This device will automatically run in the reverse direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver AND • 13-ZS-349 [13-ZS-549] LIC-CNVX-103 [LIC-CNVX-203] barrel not present AND 13-ZS-356 [13-ZS-556] LIC-CNVX-

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**

	104 [LIC-CNVX-204] barrel present AND 13-ZS-320A [13-ZS-520A] LIC-HYPU-102 [LIC-HYPU-202] Lift #2 is raised AND 13-ZS-315B [13-ZS-515B] LIC-HYPU-101 [LIC-HYPU-201] Lift #1 is lowered OR • 13-ZS-310A [13-ZS-510A] [ ] LIC-CNVX-102 [LIC-CNVX-202] barrel not present AND LIC-DOOR-102 [LIC-DOOR-202] airlock inner door open AND 13-ZS-315A [13-ZS-515A] LIC-HYPU-101 [LIC-HYPU-201] Lift #1 is raised Note: Once established, the auto reverse relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver is not active AND LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver is not active • 13-ZS-349 [13-ZS-549] LIC-CNVX-103 [LIC-CNVX-203] barrel present AND 13-ZS-315B [13-ZS-515B] LIC-HYPU-101 [LIC-HYPU-201] Lift #1 is lowered • 13-ZS-310A [13-ZS-510A] LIC-CNVX-102 [LIC-CNVX-202] barrel present AND 13-ZS-315A [13-ZS-515A] LIC-HYPU-101 [LIC-HYPU-201] Lift #1 raised
Forward I-Lock:	This device is interlocked from moving in the forward direction unless all of the following are satisfied: • 13-ZS-349 [13-ZS-549] LIC-CNVX-103 [LIC-CNVX-203] barrel not present OR • LIC-CNVX-104 [LIC-CNVX-204] lift #2 conveyor running forward AND 13-ZS-349 [13-ZS-549] LIC-CNVX-103 [LIC-CNVX-203] barrel present AND 13-ZS-315B [13-ZS-515B] LIC-HYPU-101 [LIC-HYPU-201] Lift #1 lowered AND 13-ZS-320A [13-ZS-520A] LIC-HYPU-102 [LIC-HYPU-202] Lift #2 raised • 13-XS-311 [13-XS-511] LIC-CNVX-103 [LIC-CNVX-203] lift #1 conveyor rope switch not pulled • CON E-stop not active
Reverse I-Lock:	This device is interlocked from moving in the reverse direction unless all of the following are satisfied: • 13-ZS-349 [13-ZS-549] LIC-CNVX-103 [LIC-CNVX-203] barrel not present OR • LIC-CNVX-102 [LIC-CNVX-202] slag removal conveyor running reverse AND 13-ZS-349 [13-ZS-549] LIC-CNVX-103 [LIC-CNVX-203] barrel present AND 13-ZS-315A [13-ZS-515A] LIC-HYPU-101 [LIC-HYPU-201] Lift #1 raised AND 13-ZS-305A [13-ZS-505A] LIC-DOOR-102 [LIC-DOOR-202] airlock inner door open • 13-XS-311 [13-XS-511] LIC-CNVX-103 [LIC-CNVX-203] lift #1 conveyor rope switch not pulled • CON E-stop not active

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences
Advisor PC Screen: **SR1 [SR2]**

Device:	**LIC-HYPU-102 [LIC-HYPU-202] Slag Removal Lift #2**
Advisor PC Tag:	S13HS319 [S13HS519]
CONR:	C114 [C119]
Driver Word:	2666 [2666]
Driver Type:	8
Auto Raise:	This device will automatically raise if the following logic is satisfied: • 13-ZS-320A [13-ZS-520A] LIC-HYPU-102 [LIC-HYPU-202] Lift #2 is not raised AND • LIC #1 [LIC #2] slag load drum to CNVX-107 [CNVX-207] manual start command is active AND LIC #1 [LIC #2] slag load drum to CNVX-107 [CNVX-107] is OK to load OR 13-ZS-390 [13-ZS-590] LIC-CNVX-105 [LIC-CNVX-205] barrel present AND LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver active OR {LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver AND 13-ZS-356 [13-ZS-556] LIC-CNVX-104 [LIC-CNVX-204] barrel present} Note: Once established, the auto raise relay remains latched until any of the following are satisfied: • 13-ZS-320A [13-ZS-520A] LIC-HYPU-102 [LIC-HYPU-202] Lift #2 raised • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver not active AND LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver not active
Auto Lower:	This device will automatically lower if all of the following logic is satisfied: • 13-ZS-320B [13-ZS-520B] LIC-HYPU-102 [LIC-HYPU-202] Lift #2 is not lowered AND • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver active AND 13-ZS-356 [13-ZS-556] LIC-CNVX-104 [LIC-CNVX-204] barrel present OR LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver active AND 13-ZS-349 [13-ZS-549] LIC-CNVX-103 [LIC-CNVX-203] barrel present OR {LIC#1 [LIC #2] slag unload drum to end conveyor manual start command is active AND LIC #1 [LIC #2] slag unload drum to end conveyor is OK to unload} Note: Once established, the auto lower relay remains latched until any of the following are satisfied: • 13-ZS-320B [13-ZS-520B] LIC-HYPU-102 [LIC-HYPU-202] Lift #2 lowered

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**

	• LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver not active AND LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver not active
Raise I-Lock:	This device is interlocked from raising unless all of the following are satisfied: • LIC-CNVX-104 [LIC-CNVX-204] slag removal lift #2 conveyor not running forward • LIC-CNVX-104 [LIC-CNVX-204] slag removal lift #2 conveyor not running reverse • CON E-stop not active
Lower I-Lock:	This device is interlocked from lowering unless the following are satisfied: • LIC-CNVX-104 [LIC-CNVX-204] slag removal lift #2 conveyor not running forward • LIC-CNVX-104 [LIC-CNVX-204] slag removal lift #2 conveyor not running reverse • CON E-stop not active
Device:	**LIC-CNVX-104 [LIC-CNVX-204] Slag Removal Lift #2 Conveyor**
Advisor PC Tag:	S13HS317 [S13HS517
CONR:	C114 [C119]
Driver Word:	2667 [2667]
Driver Type:	7 (without warning horn)
Auto Forward:	This device will automatically run in the forward direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver AND • 13-ZS-349 [13-ZS-549] LIC-CNVX-103 [LIC-CNVX-203] barrel present AND 13-ZS-315B [13-ZS-515B] LIC-HYPU-101 [LIC-HYPU-201] Lift #1 is lowered AND 13-ZS-320A [13-ZS-520A] LIC-HYPU-102 [LIC-HYPU-202] Lift #2 is raised AND 13-ZS-356 [13-ZS-556] LIC-CNVX-104 [LIC-CNVX-204] barrel not present OR • 13-ZS-356 [13-ZS-556] LIC-CNVX-104 [LIC-CNVX-204] barrel present AND 13-ZS-320B [13-ZS-520B] LIC-HYPU-102 [LIC-HYPU-202] Lift #2 is lowered AND 13-ZS-392 [13-ZS-592] LIC-CNVX-105 [LIC-CNVX-205] barrel not present Note: Once established, the auto forward relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver is not active • 13-ZS-356 [13-ZS-556] LIC-CNVX-104 [LIC-CNVX-204]

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**

	barrel present AND 13-ZS-320A [13-ZS-520A] LIC-HYPU-102 [LIC-HYPU-202] Lift #2 is raised • 13-ZS-390 [13-ZS-590] LIC-CNVX-105 [LIC-CNVX-205] barrel present AND 13-ZS-320B [13-ZS-520B] LIC-HYPU-102 [LIC-HYPU-202] Lift #2 is lowered
Auto Reverse:	This device will automatically run in the reverse direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver AND LIC #1 [LIC #2] slag unload drum to end conveyor driver active AND • 13-ZS-320B [13-ZS-520B] LIC-HYPU-102 [LIC-HYPU-202] Lift #2 is lowered AND 13-ZS-356 [13-ZS-556] LIC-CNVX-104 [LIC-CNVX-204] barrel not present AND 13-ZS-389 LIC-CNVX-105 [LIC-CNVX-205] barrel present AND LIC-CNVX-105 [LIC-CNVX-205] slag removal conveyor #5 auto reverse driver is active OR • 13-ZS-320A [13-ZS-520A] LIC-HYPU-102 [LIC-HYPU-202] Lift #2 is raised AND 13-ZS-356 [13-ZS-556] LIC-CNVX-104 [LIC-CNVX-204] barrel present AND 13-ZS-349 LIC-CNVX-103 [LIC-CNVX-203] barrel not present Note: Once established, the auto reverse relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver is not active AND LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver is not active • 13-ZS-356 [13-ZS-556] LIC-CNVX-104 [LIC-CNVX-204] barrel present AND 13-ZS-320B [13-ZS-520B] LIC-HYPU-102 [LIC-HYPU-202] Lift #2 is lowered • 13-ZS-349 [13-ZS-549] LIC-CNVX-103 [LIC-CNVX-203] barrel present AND 13-ZS-320A [13-ZS-520A] LIC-HYPU-102 [LIC-HYPU-202] Lift #2 is raised
Forward I-Lock:	This device is interlocked from moving in the forward direction unless all of the following are satisfied: • 13-ZS-356 [13-ZS-556] LIC-CNVX-104 [LIC-CNVX-204] barrel not present OR • 13-ZS-356 [13-ZS-556] LIC-CNVX-104 [LIC-CNVX-204] barrel present AND 13-ZS-320B [13-ZS-520B] LIC-HYPU-102 [LIC-HYPU-202] Lift #2 lowered AND LIC-CNVX-105 [LIC-CNVX-205] slag removal conveyor running forward • 13-XS-316 [13-XS-516] LIC-CNVX-104 [LIC-CNVX-204] lift #2 conveyor rope switch not pulled • CON E-stop not active

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**	
Reverse I-Lock:	This device is interlocked from moving in the reverse direction unless all of the following are satisfied: • 13-ZS-356 [13-ZS-556] LIC-CNVX-104 [LIC-CNVX-204] barrel not present OR • 13-ZS-356 [13-ZS-556] LIC-CNVX-104 [LIC-CNVX-204] barrel present AND 13-ZS-315B [13-ZS-515B] LIC-HYPU-101 [LIC-HYPU-201] Lift #1 lowered AND 13-ZS-320A [13-ZS-520A] LIC-HYPU-102 [LIC-HYPU-202] Lift #2 raised AND LIC-CNVX-103 [LIC-CNVX-203] lift #1 conveyor running reverse • 13-XS-316 [13-XS-516] LIC-CNVX-104 [LIC-CNVX-204] lift #2 conveyor rope switch not pulled • CON E-stop not active
Device:	**LIC-CNVX-105 [LIC-CNVX-205] Slag Removal Conveyor #5**
Advisor PC Tag:	S13HS322 [S13HS522]
CONR:	C114 [C119]
Driver Word:	2668 [2668]
Driver Type:	7 (without warning horn)
Auto Forward:	This device will automatically run in the forward direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver AND • 13-ZS-356 [13-ZS-556] LIC-CNVX-104 [LIC-CNVX-204] barrel present AND 13-ZS-392 [13-ZS-592] LIC-CNVX-105 [LIC-CNVX-205] barrel not present AND 13-ZS-320B [13-ZS-520B] LIC-HYPU-102 [LIC-HYPU-202] Lift #2 is lowered OR • 13-ZS-392 [13-ZS-592] LIC-CNVX-105 [LIC-CNVX-205] barrel present AND 13-ZS-347 [13-ZS-547] LIC-CNVX-106B [LIC-CNVX-206B] barrel not present Note: Once established, the auto forward relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver is not active • 13-ZS-347 [13-ZS-547] LIC-CNVX-106B [LIC-CNVX-206B] barrel present
Auto Reverse:	This device will automatically run in the reverse direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver AND • LIC #1 [LIC #2] slag transfer drum to cooling conveyor start driver is active AND 13-ZS-347 [13-ZS-547] LIC-CNVX-

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**

	106B [LIC-CNVX-206B] barrel present AND LIC-CNVX-106B [LIC-CNVX-206B] 1st 90 degree lift raised AND 13-ZS-390 [13-ZS-590] LIC-CNVX-105 [LIC-CNVX-205] barrel not present OR • {LIC #1 [LIC #2] slag unload drum to end conveyor manual start command is active AND LIC #1 [LIC #2] slag unload drum to end conveyor 'OK to unload'} AND • {13-ZS-392 [13-ZS-592] LIC-CNVX-105 [LIC-CNVX-205] barrel present OR 13-ZS-389 [13-ZS-589] LIC-CNVX-105 [LIC-CNVX-205] barrel present OR 13-ZS-391 [13-ZS-591] LIC-CNVX-105 [LIC-CNVX-205] barrel present OR 13-ZS-390 [13-ZS-590] LIC-CNVX-105 [LIC-CNVX-205] barrel present} Note: Once established, the auto reverse relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver is not active • LIC #1 [LIC #2] slag transfer drum to cooling conveyer start driver is active AND 13-ZS-392 [13-ZS-592] LIC-CNVX-105 [LIC-CNVX-205] barrel present one-shot timer timing • LIC #1 [LIC #2] slag unload drum to end conveyor start driver is active AND 13-ZS-389 [13-ZS-589] LIC-CNVX-105 [LIC-CNVX-205] barrel present - trailing edge AND 13-ZS-389 [13-ZS-589] LIC-CNVX-105 [LIC-CNVX-205] barrel present one-shot timer timing • 13-ZS-356 [13-ZS-556] LIC-CNVX-104 [LIC-CNVX-204] barrel present
Forward I-Lock:	This device is interlocked from moving in the forward direction unless all of the following are satisfied: • 13-ZS-392 [13-ZS-592] LIC-CNVX-105 [LIC-CNVX-205] barrel not present OR • 13-ZS-331A [13-ZS-531A] LIC-CNVX-106B [LIC-CNVX-206B] lift raised AND 13-ZS-392 [13-ZS-592] LIC-CNVX-105 [LIC-CNVX-205] barrel present AND LIC-CNVX-106B [LIC-CNVX-206B] conveyor running forward • 13-XS-321 [13-XS-521] LIC-CNVX-105 [LIC-CNVX-205] slag removal conveyor rope switch not pulled • CON E-stop not active
Reverse I-Lock:	This device is interlocked from moving in the reverse direction unless all of the following are satisfied: • 13-ZS-389 [13-ZS-589] LIC-CNVX-105 [LIC-CNVX-205] barrel not present OR • 13-ZS-389 [13-ZS-589] LIC-CNVX-105 [LIC-CNVX-205] barrel present AND LIC-CNVX-104 [LIC-CNVX-204] lift #2

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**

	conveyor running reverse AND 13-ZS-320B [13-ZS-520B] LIC-HYPU-102 [LIC-HYPU-202] slag removal 2nd lift lowered • 13-XS-321 [13-XS-521] LIC-CNVX-105 [LIC-CNVX-205] slag removal conveyor rope switch not pulled • CON E-stop not active
Device:	**LIC-CNVX-106B [LIC-CNVX-206B] 90 Degree Conveyor #1**
Advisor PC Tag:	S13HS329 [S13HS529]
CONR:	C114 [C119]
Driver Word:	2669 [2669]
Driver Type:	7 (without warning horn)
Auto Forward:	This device will automatically run in the forward direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver active • 13-ZS-392 [13-ZS-592] LIC-CNVX-105 [LIC-CNVX-205] barrel present • LIC-CNVX-106B [LIC-CNVX-206B] 90 conveyor #1 lift raised Note: Once established, the auto forward relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver is not active • 13-ZS-347 [13-ZS-547] LIC-CNVX-106B [LIC-CNVX-206B] barrel present
Auto Reverse:	This device will automatically run in the reverse direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver active • LIC-CNVX-106B [LIC-CNVX-206B] 90 conveyor #1 lift raised • 13-ZS-347 [13-ZS-547] LIC-CNVX-106B [LIC-CNVX-206B] barrel present Note: Once established, the auto reverse relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver is not active • 13-ZS-392 [13-ZS-592] LIC-CNVX-105 [LIC-CNVX-205] barrel present one-shot timer timing
Forward I-Lock:	This device is interlocked from moving in the forward direction unless all of the following are satisfied: • 13-ZS-347 [13-ZS-547] LIC-CNVX-106B [LIC-CNVX-206B] barrel not present OR

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**	
	• 13-ZS-331A [13-ZS-531A] LIC-CNVX-106B [LIC-CNVX-206B] lift raised AND 13-ZS-347 [13-ZS-547] LIC-CNVX-106B [LIC-CNVX-206B] barrel not present • CON E-stop not active
Reverse I-Lock:	This device is interlocked from moving in the reverse direction unless all of the following are satisfied: • 13-ZS-347 [13-ZS-547] LIC-CNVX-106B [LIC-CNVX-206B] barrel not present OR • 13-ZS-347 [13-ZS-547] LIC-CNVX-106B [LIC-CNVX-206B] barrel present AND LIC-CNVX-105 [LIC-CNVX-205] slag removal conveyor running reverse AND LIC-CNVX-106B [LIC-CNVX-206B] lift raised • CON E-stop not active
Device:	**LIC-CNVX-106B [LIC-CNVX-206B] 90 Degree Conveyor #1 Lift**
Advisor PC Tag:	S13HS330 [S13HS530]
CONR:	C114 [C119]
Driver Word:	2670 [2670]
Driver Type:	8
Auto Raise:	This device will automatically raise if the following logic is satisfied: • LIC-CNVX-106B [LIC-CNVX-206B] 90 degree conveyor #1 lift is not raised AND • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver active AND 13-ZS-392 [13-ZS-592] LIC-CNVX-105 [LIC-CNVX-205] barrel present OR • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver AND 13-ZS-347 [13-ZS-547] LIC-CNVX-106B [LIC-CNVX-206B] barrel present Note: Once established, the auto raise relay remains latched until any of the following are satisfied: • LIC-CNVX-106B [LIC-CNVX-206B] 90 degree conveyor lift #1 raised • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver not active AND LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver not active
Auto Lower:	This device will automatically lower if all of the following logic is satisfied: • LIC-CNVX-106B [LIC-CNVX-206B] 90 degree conveyor #1 lift is not lowered AND • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver active AND 13-ZS-347 [13-ZS-547] LIC-CNVX-106B [LIC-CNVX-206B] barrel present

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**

	OR • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver AND 13-ZS-348 [13-ZS-548] LIC-CNVX-106C [LIC-CNVX-206C] barrel present Note: Once established, the auto lower relay remains latched until any of the following are satisfied: • LIC-CNVX-106B [LIC-CNVX-206B] 90 degree conveyor lift #1 lowered • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver not active AND LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver not active
Raise I-Lock:	This device is interlocked from raising unless all of the following are satisfied: • LIC-CNVX-106A [LIC-CNVX-206A] slag removal conveyor not running forward • LIC-CNVX-106A [LIC-CNVX-206A] slag removal conveyor not running reverse • LIC-CNVX-106B [LIC-CNVX-206B] slag removal conveyor not running forward • LIC-CNVX-106B [LIC-CNVX-206B] slag removal conveyor not running reverse • CON E-stop not active
Lower I-Lock:	This device is interlocked from lowering unless the following are satisfied: • LIC-CNVX-106B [LIC-CNVX-206B] slag removal conveyor not running forward • LIC-CNVX-106B [LIC-CNVX-206B] slag removal conveyor not running reverse • CON E-stop not active
Device:	**LIC-CNVX-106A [LIC-CNVX-206A] Slag Removal Conveyor #6**
Advisor PC Tag:	S13HS328 [S13HS528]
CONR:	C114 [C119]
Driver Word:	2671 [2671]
Driver Type:	7 (without warning horn)
Auto Forward:	This device will automatically run in the forward direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver active • 13-ZS-347 [13-ZS-547] LIC-CNVX-106B [LIC-CNVX-206B] barrel present • LIC-CNVX-106B [LIC-CNVX-206B] 90 conveyor #1 lift lowered

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences
Advisor PC Screen: **SR1 [SR2]**

	Note: Once established, the auto forward relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver is not active • 13-ZS-348 [13-ZS-548] LIC-CNVX-106C [LIC-CNVX-206C] barrel present
Auto Reverse:	This device will automatically run in the reverse direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver active • 13-ZS-348 [13-ZS-548] LIC-CNVX-106C [LIC-CNVX-206C] barrel present • LIC-CNVX-106C [LIC-CNVX-206C] 90 conveyor #2 lift lowered Note: Once established, the auto reverse relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver is not active • 13-ZS-347 [13-ZS-547] LIC-CNVX-106B [LIC-CNVX-206B] barrel present
Forward I-Lock:	This device is interlocked from moving in the forward direction unless all of the following are satisfied: • 13-ZS-331B [13-ZS-531B] LIC-CNVX-106B [LIC-CNVX-206B] lift lowered • 13-ZS-348 [13-ZS-548] LIC-CNVX-106C [LIC-CNVX-206C] barrel not present • 13-ZS-334B [13-ZS-534B] LIC-CNVX-106C [LIC-CNVX-206C] lift lowered • 13-XS-327A/B [13-ZS-527A/B] rope switch not pulled • CON E-stop not active
Reverse I-Lock:	This device is interlocked from moving in the reverse direction unless all of the following are satisfied: • 13-ZS-334B [13-ZS-534B] LIC-CNVX-106C [LIC-CNVX-206C] lift lowered • 13-ZS-331B [13-ZS-531B] LIC-CNVX-106B [LIC-CNVX-206B] lift lowered • 13-ZS-347 [13-ZS-547] LIC-CNVX-106B [LIC-CNVX-206B] barrel not present • 13-XS-327A/B [13-ZS-527A/B] rope switch not pulled • CON E-stop not active
Device:	**LIC-CNVX-106C [LIC-CNVX-206C] 90 Degree Conveyo r #2**
Advisor PC Tag:	S13HS332 [S13HS532]
CONR:	C114 [C119]

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**

Driver Word:	2672 [2672]
Driver Type:	7 (without warning horn)
Auto Forward:	This device will automatically run in the forward direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver active • LIC-CNVX-106C [LIC-CNVX-206C] 90 conveyor #2 lift raised • 13-ZS-348 [13-ZS-548] LIC-CNVX-106C [LIC-CNVX-206C] barrel present • 13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel not present - trailing edge AND 13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel not present - leading edge OR 13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel present - trailing edge AND 13-ZS-341 [13-ZS-541] LIC-CNVX-108 [LIC-CNVX-208] stage #1 barrel preset one-shot timer timing Note: Once established, the auto forward relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver is not active • 13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel present one-shot timer timing
Auto Reverse:	This device will automatically run in the reverse direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver active • LIC #1 [LIC #2] slag transfer drum to cooling conveyor manual start command active • LIC #1 [LIC #2] slag transfer drum to cooling conveyor 'OK to transfer' • 13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel present Note: Once established, the auto reverse relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver is not active • 13-ZS-348 [13-ZS-548] LIC-CNVX-106C [LIC-CNVX-206C] barrel present
Forward I-Lock:	This device is interlocked from moving in the forward direction unless all of the following are satisfied: • 13-ZS-348 [13-ZS-548] LIC-CNVX-106C [LIC-CNVX-206C] barrel not present OR

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**

	• LIC-CNVX-107 [LIC-CNVX-207] slag fill conveyor running forward AND 13-ZS-347 [13-ZS-547] LIC-CNVX-106C [LIC-CNVX-206C] barrel present AND 13-ZS-334A [13-ZS-534A] LIC-CNVX-106C [LIC-CNVX-206C] lift raised • CON E-stop not active
Reverse I-Lock:	This device is interlocked from moving in the reverse direction unless all of the following are satisfied: • 13-ZS-348 [13-ZS-548] LIC-CNVX-106C [LIC-CNVX-206C] barrel not present OR • 13-ZS-348 [13-ZS-548] LIC-CNVX-106C [LIC-CNVX-206C] barrel not present AND LIC-CNVX-106C [LIC-CNVX-206C] lift raised • CON E-stop not active
Device:	**LIC-CNVX-106C [LIC-CNVX-206C] 90 Degree Conveyor #2 Lift**
Advisor PC Tag:	S13HS333 [S13HS533]
CONR:	C114 [C119]
Driver Word:	2673 [2673]
Driver Type:	8
Auto Raise:	This device will automatically raise if the following logic is satisfied: • LIC-CNVX-106C [LIC-CNVX-206C] 90 degree conveyor #2 lift is not raised AND • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver active AND 13-ZS-348 [13-ZS-548] LIC-CNVX-106C [LIC-CNVX-206C] barrel present OR • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver active AND 13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel present AND 13-ZS-348 [13-ZS-548] LIC-CNVX-106C [LIC-CNVX-206C] barrel present Note: Once established, the auto raise relay remains latched until any of the following are satisfied: • LIC-CNVX-106C [LIC-CNVX-206C] 90 degree conveyor lift #2 raised • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver not active AND LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver not active
Auto Lower:	This device will automatically lower if all of the following logic is satisfied: • LIC-CNVX-106C [LIC-CNVX-206C] 90 degree conveyor #2 lift is not lowered AND • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**

	driver active AND 13-ZS-347 [13-ZS-547] LIC-CNVX-106B [LIC-CNVX-206B] barrel present OR • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver AND 13-ZS-348 [13-ZS-548] LIC-CNVX-106C [LIC-CNVX-206C] barrel present Note: Once established, the auto lower relay remains latched until any of the following are satisfied: • LIC-CNVX-106C [LIC-CNVX-206C] 90 degree conveyor lift #2 lowered • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver not active AND LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver not active
Raise I-Lock:	This device is interlocked from raising unless all of the following are satisfied: • LIC-CNVX-106A [LIC-CNVX-206A] slag removal conveyor not running forward • LIC-CNVX-106A [LIC-CNVX-206A] slag removal conveyor not running reverse • LIC-CNVX-106C [LIC-CNVX-206C] slag removal conveyor not running forward • LIC-CNVX-106C [LIC-CNVX-206C] slag removal conveyor not running reverse • CON E-stop not active
Lower I-Lock:	This device is interlocked from lowering unless the following are satisfied: • LIC-CNVX-106C [LIC-CNVX-206C] slag removal conveyor not running forward • LIC-CNVX-106C [LIC-CNVX-206C] slag removal conveyor not running reverse • CON E-stop not active
Device:	**LIC-CNVX-107 [LIC-CNVX-207] Slag Removal Conveyor Fill Section**
Advisor PC Tag:	S13HS336 [S13HS536]
CONR:	C114 [C119]
Driver Word:	2674 [2674]
Driver Type:	7 (without warning horn)
Auto Forward:	This device will automatically run in the forward direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver active • 13-ZS-348 [13-ZS-548] LIC-CNVX-106C [LIC-CNVX-206C] barrel present

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**

	Note: Once established, the auto forward relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver is not active • 13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel present - trailing edge AND 13-ZS-348 [13-ZS-548] LIC-CNVX-106C [LIC-CNVX-206C] barrel not present
Auto Reverse:	This device will automatically run in the reverse direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver active AND • {LIC #1 [LIC #2] slag transfer drum to cooling conveyor start driver active AND 13-ZS-348 [13-ZS-548] LIC-CNVX-106C [LIC-CNVX-206C] barrel not present AND 13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel present} OR • {13-ZS-341 [13-ZS-541] LIC-CNVX-108 [LIC-CNVX-208] barrel present AND 13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel not present AND 13-ZS-348 [13-ZS-548] LIC-CNVX-106C [LIC-CNVX-206C] barrel present} OR • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver active AND 13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel present AND 13-ZS-348 [13-ZS-548] LIC-CNVX-106C [LIC-CNVX-206C] barrel not present Note: Once established, the auto reverse relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver is not active AND LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver is not active • 13-ZS-348 [13-ZS-548] LIC-CNVX-106C [LIC-CNVX-206C] barrel present AND 13-ZS-341 [13-ZS-541] LIC-CNVX-108 [LIC-CNVX-208] barrel not present AND LIC-CNVX-108 [LIC-CNVX-208] conveyor #8 - stage #1 not running reverse • 13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel present one-shot timer timing • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver active AND 13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel present one-shot timer timing
Forward I-Lock:	This device is interlocked from moving in the forward direction unless all of the following are satisfied: • Slag removal slide gate is closed AND {13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel not present -

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**

	trailing edge AND [LIC-CNVX-207 slag removal conveyor #7 "device in auto", LIC#2 only] OR LIC-CNVX-108 [LIC-CNVX-208] staging conveyor #1 running forward OR • 13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] fill section barrel not present • 13-XS-335A/B [13-XS-535A/B] LIC-CNVX-107 [LIC-CNVX-207] slag fill conveyor rope switch not pulled • CON E-stop not active
Reverse I-Lock:	This device is interlocked from moving in the reverse direction unless all of the following are satisfied: • 13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel not present OR • 13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel present AND LIC-CNVX-106C [LIC-CNVX-206C] conveyor running reverse AND LIC-CNVX-106C [LIC-CNVX-206C] lift raised AND Slag removal slide gate closed • 13-XS-335A/B [13-XS-535A/B] LIC-CNVX-107 [LIC-CNVX-207] slag fill conveyor rope switch not pulled • CON E-stop not active
Device:	**LIC-CNVX-108 [LIC-CNVX-208] Slag Removal Conveyor #8 - Stage #1**
Advisor PC Tag:	S13HS339 [S13HS539]
CONR:	C114 [C119]
Driver Word:	2675 [2675]
Driver Type:	7 (without warning horn)
Auto Forward:	This device will automatically run in the forward direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver active • 13-ZS-348 [13-ZS-548] LIC-CNVX-106C [LIC-CNVX-206C] barrel present one-shot timer timing • 13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel present OR 13-ZS-341 [13-ZS-541] LIC-CNVX-108 [LIC-CNVX-208] barrel present Note: Once established, the auto forward relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver is not active • LIC-CNVX-108 [LIC-CNVX-208] conveyor running forward AND 13-ZS-339 [13-ZS-539] LIC-CNVX-108 [LIC-CNVX-208] barrel present one-shot timer timing

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**

Auto Reverse:	This device will automatically run in the reverse direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver active AND • {13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel not present AND 13-ZS-348 [13-ZS-548] LIC-CNVX-106C [LIC-CNVX-206C] barrel present AND 13-ZS-341 [13-ZS-541] LIC-CNVX-108 [LIC-CNVX-208] barrel present} OR • 13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel present AND 13-ZS-341 [13-ZS-541] LIC-CNVX-108 [LIC-CNVX-208] barrel not present AND 13-ZS-344 [13-ZS-544] LIC-CNVX-109 [LIC-CNVX-209] barrel present Note: Once established, the auto reverse relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver is not active • LIC-CNVX-108 [LIC-CNVX-208] conveyor running forward AND {13-ZS-341 [13-ZS-541] LIC-CNVX-108 [LIC-CNVX-208] barrel present one-shot timer timing OR 13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel present one-shot timer timing}
Forward I-Lock:	This device is interlocked from moving in the forward direction unless all of the following are satisfied: • 13-ZS-341 [13-ZS-541] LIC-CNVX-108 [LIC-CNVX-208] barrel not present OR • 13-ZS-341 [13-ZS-541] LIC-CNVX-108 [LIC-CNVX-208] barrel present AND LIC-CNVX-109 [LIC-CNVX-209] staging conveyor #2 running forward • 13-XS-335A/B [13-XS-535A/B] LIC-CNVX-107 [LIC-CNVX-207] slag fill conveyor rope switch not pulled • CON E-stop not active
Reverse I-Lock:	This device is interlocked from moving in the reverse direction unless all of the following are satisfied: • 13-ZS-341 [13-ZS-541] LIC-CNVX-108 [LIC-CNVX-208] barrel not present OR • 13-ZS-341 [13-ZS-541] LIC-CNVX-108 [LIC-CNVX-208] barrel present AND LIC-CNVX-107 [LIC-CNVX-207] slag fill conveyor running reverse • 13-XS-335A/B [13-XS-535A/B] LIC-CNVX-107 [LIC-CNVX-207] slag fill conveyor rope switch not pulled • CON E-stop not active

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences
Advisor PC Screen: **SR1 [SR2]**

Device:	**LIC-CNVX-109 [LIC-CNVX-209] Slag Removal Conveyor #9 - Stage #2**
Advisor PC Tag:	S13HS342 [S13HS542]
CONR:	C114 [C119]
Driver Word:	2676 [2676]
Driver Type:	7 (without warning horn)
Auto Forward:	This device will automatically run in the forward direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver active • 13-ZS-348 [13-ZS-548] LIC-CNVX-106C [LIC-CNVX-206C] barrel present one-shot timer timing • 13-ZS-344 [13-ZS-544] LIC-CNVX-109 [LIC-CNVX-209] barrel present OR 13-ZS-341 [13-ZS-541] LIC-CNVX-108 [LIC-CNVX-208] barrel present Note: Once established, the auto forward relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver is not active • LIC-CNVX-109 [LIC-CNVX-209] conveyor running forward AND 13-ZS-344 [13-ZS-544] LIC-CNVX-109 [LIC-CNVX-209] barrel present one-shot timer timing
Auto Reverse:	This device will automatically run in the reverse direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver active AND • {13-ZS-341 [13-ZS-541] LIC-CNVX-108 [LIC-CNVX-208] barrel not present AND 13-ZS-344 [13-ZS-544] LIC-CNVX-109 [LIC-CNVX-209] barrel present AND 13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel present} OR • {13-ZS-341 [13-ZS-541] LIC-CNVX-108 [LIC-CNVX-208] barrel present AND 13-ZS-344 [13-ZS-544] LIC-CNVX-109 [LIC-CNVX-209] barrel not present AND 13-ZS-346 [13-ZS-346] LIC-CNVX-110 [LIC-CNVX-210] barrel present} Note: Once established, the auto reverse relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver is not active • LIC-CNVX-109 [LIC-CNVX-209] conveyor running forward AND {13-ZS-344 [13-ZS-544] LIC-CNVX-109 [LIC-CNVX-209] barrel present one-shot timer timing OR 13-ZS-341 [13-ZS-541] LIC-CNVX-108 [LIC-CNVX-208] barrel present one-shot timer timing}

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**	
Forward I-Lock:	This device is interlocked from moving in the forward direction unless all of the following are satisfied: • 13-ZS-344 [13-ZS-544] LIC-CNVX-109 [LIC-CNVX-209] barrel not present OR • 13-ZS-344 [13-ZS-544] LIC-CNVX-109 [LIC-CNVX-209] barrel present AND LIC-CNVX-110 [LIC-CNVX-210] staging conveyor #3 running forward • 13-XS-335A/B [13-XS-535A/B] LIC-CNVX-107 [LIC-CNVX-207] slag fill conveyor rope switch not pulled • CON E-stop not active
Reverse I-Lock:	This device is interlocked from moving in the reverse direction unless all of the following are satisfied: • 13-ZS-344 [13-ZS-544] LIC-CNVX-109 [LIC-CNVX-209] barrel not present OR • 13-ZS-344 [13-ZS-544] LIC-CNVX-109 [LIC-CNVX-209] barrel present AND LIC-CNVX-108 [LIC-CNVX-208] staging conveyor #1 running reverse • 13-XS-335A/B [13-XS-535A/B] LIC-CNVX-107 [LIC-CNVX-207] slag fill conveyor rope switch not pulled • CON E-stop not active
Device:	**LIC-CNVX-110 [LIC-CNVX-210] Slag Removal Conveyor #10 - Stage #3**
Advisor PC Tag:	S13HS345 [S13HS545]
CONR:	C114 [C119]
Driver Word:	2677 [2677]
Driver Type:	7 (without warning horn)
Auto Forward:	This device will automatically run in the forward direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver active • 13-ZS-348 [13-ZS-548] LIC-CNVX-106C [LIC-CNVX-206C] barrel present one-shot timer timing • 13-ZS-344 [13-ZS-544] LIC-CNVX-109 [LIC-CNVX-209] barrel present Note: Once established, the auto forward relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver is not active • 13-ZS-346 [13-ZS-346] LIC-CNVX-110 [LIC-CNVX-210] barrel present one-shot timer timing
Auto Reverse:	This device will automatically run in the reverse direction if all of the following relays are energized: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver active

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences
Advisor PC Screen: **SR1 [SR2]**

	• 13-ZS-341 [13-ZS-541] LIC-CNVX-108 [LIC-CNVX-208] barrel present • 13-ZS-344 [13-ZS-544] LIC-CNVX-109 [LIC-CNVX-209] barrel not present • 13-ZS-346 [13-ZS-346] LIC-CNVX-110 [LIC-CNVX-210] barrel present Note: Once established, the auto reverse relay remains latched until any of the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver is not active • 13-ZS-344 [13-ZS-544] LIC-CNVX-109 [LIC-CNVX-209] barrel present one-shot timer timing
Forward I-Lock:	This device is interlocked from moving in the forward direction unless all of the following are satisfied: • 13-ZS-346 [13-ZS-346] LIC-CNVX-110 [LIC-CNVX-210] barrel not present • 13-XS-335A/B [13-XS-535A/B] LIC-CNVX-107 [LIC-CNVX-207] slag fill conveyor rope switch not pulled • CON E-stop not active
Reverse I-Lock:	This device is interlocked from moving in the reverse direction unless all of the following are satisfied: • 13-ZS-346 [13-ZS-346] LIC-CNVX-110 [LIC-CNVX-210] barrel not present OR {13-ZS-346 [13-ZS-346] LIC-CNVX-110 [LIC-CNVX-210] barrel present AND LIC-CNVX-109 [LIC-CNVX-209] staging conveyor #2 running reverse} • 13-XS-335A/B [13-XS-535A/B] LIC-CNVX-107 [LIC-CNVX-207] slag fill conveyor rope switch not pulled • CON E-stop not active
Device:	**LIC-GATE-101 [LIC-GATE-210] Slag Removal Slide Gate**
Advisor PC Tag:	S13HS368 [S13HS568]
CONR:	C114 [C119]
Driver Word:	2678 [2678]
Driver Type:	4
Auto Open:	There is no software logic to automatically open this device
Auto Close:	There is no software logic to automatically close this device
Open I-Lock:	This device is interlocked from opening unless all of the following are satisfied: • 13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel present • Agent block valves 13-XV-134A/B [13-XV-761A/B] both closed • Fuel oil purge block valves 13-XV-105A/B [13-XV-205A/B *at TE, 13-XV-726A/B at AN*] both closed

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**	
	• Decon/Water 3-way valve open to water • *(AN only)* LIC slag removal system zone #3 temperature low alarm not active *(see FAWB Note B-21)* • CON E-stop not active
Close I-Lock:	This device is interlocked from closing unless the following is satisfied: • 13-ZS-363 [13-ZS-563] LIC-DRILL-101 [LIC-DRILL-201] hammerdrill retracted • *(TE only) CRO sets SRS slide gate bypass permissive (see FAWB Note B-21)*
Device: Advisor PC Tag: CONR: Driver Word: Driver Type:	**LIC #1 [LIC #2] Slag Removal System Auto Forward Icon** SRS1AUTOF [SRS2AUTOF] C114 [C119] 2679 [2679] N/A This icon is used to place the SRS system in the Auto Forward mode. The LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver is activated by the manual start command. The driver remains activated until a manual stop command is issued by the CRO.
Device: Advisor PC Tag: CONR: Driver Word: Driver Type:	**LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon** SRS1AUTOR [SRS2AUTOR] C114 [C119] 2680 [2680] N/A This icon is used to place the SRS system in the Auto Reverse mode. The LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver is activated by the manual start command. The driver remains activated until a manual stop command is issued by the CRO.
Device: Advisor PC Tag: CONR: Driver Word: Driver Type:	**LIC-DRILL-101 [LIC-DRILL-201] Hammerdrill Carriage** S13HS366 [S13HS566] C114 [C119] 2681 [2681] 4
Auto Forward:	There is no software logic to automatically start this device in the forward direction
Auto Reverse:	There is no software logic to automatically start this device in the reverse direction
Forward I-Lock:	This device is interlocked from moving in the forward direction unless all of the following are satisfied: • Slag removal slide gate is open

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**

	• LIC #1 [LIC #2] slag removal system hammerdrill stall alarm is not active
Reverse I-Lock:	There is no software interlock to inhibit moving this device in the reverse direction
Device:	**LIC-DRILL-101 [LIC-DRILL-201] Hammerdrill Hammer**
Advisor PC Tag:	S13HS362 [S13HS562]
CONR:	C114 [C119]
Driver Word:	2682 [2682]
Driver Type:	3
Auto Start:	There is no software logic to automatically start this device
Start I-Lock:	This device is interlocked from running unless the following are satisfied: • Slag removal slide gate is open
Device:	**LIC #1 [LIC #2] Slag Removal System Load Barrel to LIC-CNVX-107 [LIC-CNVX-207] Icon**
Advisor PC Tag:	S1DRM_IN [S2DRM_IN]
CONR:	C114 [C119]
Driver Word:	2683 [2683]
Driver Type:	N/A
	This icon is used to request a barrel to be loaded onto LIC-CNVX-107 [LIC-CNVX-207] fill conveyor. This driver is activated by the manual start command. The driver remains activated until a manual stop command is issued by the CRO, it is I-Locked, a barrel is detected at LIC-CNVX-107 [LIC-CNVX-207] (13-ZS-338 [13-ZS-538]), or LIC-CNVX-107 [LIC-CNVX-207] is run in reverse.
Start I-Lock:	This icon driver will not activate unless the following are satisfied: • Slag removal slide gate is closed • LIC #1 [LIC #2] Slag Removal System Auto Forward Icon driver is active • 13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel present - trailing edge OR 13-ZS-346 [13-ZS-346] LIC-CNVX-110 [LIC-CNVX-210] barrel not present OR 13-ZS-338 [13-ZS-538] LIC-CNVX-107 [LIC-CNVX-207] barrel not present OR LIC-CNVX-107 [LIC-CNVX-207] conveyor running forward
Device:	**LIC #1 [LIC #2] Slag Removal System Transfer Barrel to Cooling Conveyor Icon**
Advisor PC Tag:	S1DRM_XFR [SR2DRM_XFR]
CONR:	C114 [C119]
Driver Word:	2684 [2684]

Table D.5. *ANCDF and* TOCDF LIC Furnace PLC Automatic Control Sequences Advisor PC Screen: **SR1 [SR2]**	
Driver Type:	N/A This icon is used to request a barrel to be transferred to the cooling conveyor. This driver is activated by the manual start command. The driver remains activated until a manual stop command is issued by the CRO, it is I-Locked, a barrel is detected at LIC-CNVX-105 [LIC-CNVX-205] (13-ZS-392 [13-ZS-592] one-shot timer), or LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver is not active.
Start I-Lock:	This icon driver will not activate unless the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver is active • 13-ZS-367B [13-ZS-567B] LIC-GATE-101 [LIC-GATE-201] slide gate closed • LIC #1 [LIC #2] slag removal system unload barrel to end conveyor driver is not active • {13-ZS-390 [13-ZS-590] LIC-CNVX-105 [LIC-CNVX-205] barrel not present AND 13-ZS-389 [13-ZS-589] LIC-CNVX-105 [LIC-CNVX-205] barrel not present} OR 13-ZS-347 [13-ZS-547] LIC-CNVX-106B [LIC-CNVX-206B] barrel not present
Device:	**LIC #1 [LIC #2] Slag Removal System Unload Barrel to End Conveyor Icon**
Advisor PC Tag:	S1DRM_ULD [S2DRM_ULD]
CONR:	C114 [C119]
Driver Word:	2685 [2685]
Driver Type:	N/A This icon is used to request a barrel to be unloaded to the end conveyor. This driver is activated by the manual start command. The driver remains activated until a manual stop command is issued by the CRO, it is I-Locked, a barrel is detected at LIC-CNVX-101 [LIC-CNVX-201] (13-ZS-309A [13-ZS-509A] one-shot timer), or LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver is not active.
Start I-Lock:	This icon driver will not activate unless the following are satisfied: • LIC #1 [LIC #2] Slag Removal System Auto Reverse Icon driver is active • LIC #1 [LIC #2] Slag Removal System Transfer Barrel to Cooling Conveyor driver is not active • 13-ZS-309A [13-ZS-509A] LIC-CNVX-101 [LIC-CNVX-201] barrel not present

D.2 LIC Furnace BMS Control Logic

There are five important control circuits associated with the FIREYE control schemes for the LIC furnaces. They are defined as:

L1-13 — Burner start circuit. It is usually energized via a discrete output from the PLC-3. It is a result of the operator starting a burner from a control screen.

13-3 — Fuel Valve End Switch (FVES) circuit. This circuit will be energized when all of the associated fuel gas block valves are closed. This circuit is required only until the "Pilot Trial For Ignition" step.

3-P — Running Interlock circuit. This circuit will contain the logic contacts associated with an operating burner. It will include items such as gas supply pressure HI HI, gas supply pressure LO LO, Extreme Thermal Limit (ETL), combustion air blower pressure LO LO, etc. If the 3-P circuit is lost at any time during the operation of the burner, the burner will LOCKOUT.

M-D — LO-FIRE circuit. This circuit will energize when the associated fuel gas control valve and combustion air control damper are at LO-FIRE. This circuit is required for lighting the burner.

D-8 — HI-PURGE circuit. This circuit will energize when the purge timer expires. This circuit is required for lighting the burner.

The control logic presented in Table D.6 is based on TOCDF drawings EG-01-E-6013, LIC Purge Bypass ICS-PANL-116 (sheets 1 to 4) and EG-01-E-6012, LIC Purge Bypass ICS-PANL-121 (sheets 1 to 4).

Table D.6. *ANCDF and* TOCDF LIC BMS Circuit Logic

System Purge

The system purge timer (TR-129) will initiate if all of the following conditions are satisfied:

- ZS-134B [ZS-761B] agent block valve XV-134A [XV-761A] closed
- ZS-134C [ZS-761C] agent block valve XV-134B [XV-761B] closed
- ZS-108B [ZS-792B] secondary fuel gas block valve XV-108A [XV-792A] closed
- ZS-108C [ZS-792C] secondary fuel gas block valve XV-108B [XV-792B] closed
- ZS-122B [ZS-747B] primary fuel gas block valve XV-122A [XV-747A] closed
- ZS-122C [ZS-747C] primary fuel gas block valve XV-122B [XV-747B] closed

Table D.6. *ANCDF and* TOCDF LIC BMS Circuit Logic

- ZS-50A [ZS-788A] secondary combustion air flow control valve at high fire
- ZS-42A [ZS-743A] primary combustio n air flow control valve at high fire
- 24-FSL-431 [24-FSL-901] minimum draft to purge
- TSLLL-611 [TSLLL-711] secondary chamber exhaust gas above 1400 °F

  -OR-
  - PSLL-200 [PSLL-795] secondary combustion air blower pressure low low
  - 24-FSLL-431 [24-FSLL-902 *at TE, 24-FSLL-901 at AN*] LIC system minimum draft
  - LIC-BLOW-102 [LIC-BLOW-202] secondary combustion air blower running
  - Either stage of the ID Fan running
- TSLLL-610 [TSLLL-710] crossover duct gas above 2000°F *at TE, 1400°F at AN*

  -OR-
  - PSLL-44 [PSLL-741] primary combustion air blower pressure low low
  - 24-FSLL-431 [24-FSLL-902 *at TE, 24-FSLL-901 at AN*] LIC system minimum draft
  - LIC-BLOW-101 [LIC-BLOW-201] primary combustion air blower running
  - Either stage of the ID fan running
- 24-FSLL-431 [24-FSLL-902 *at TE, 24-FSLL-901 at AN*] LIC system minimum draft

Once initiated, the system purge timer will time out after eight minutes. Once timed out, the following conditions must be satisfied to maintain system purge:

- TSLLL-611 [TSLLL-711] secondary chamber exhaust gas above 1400 °F

  -OR-
  - PSLL-200 [PSLL-795] secondary combustion air blower pressure low low
  - 24-FSLL-431 [24-FSLL-902 *at TE, 24-FSLL-901 at AN*] LIC system minimum draft
  - LIC-BLOW-102 [LIC-BLOW-202] secondary combustion air blower running
  - Either stage of the ID fan running
- TSLLL-610 [TSLLL-710] crossover duct gas above 2000°F *at TE, 1400°F at AN*

  -OR-
  - PSLL-44 [PSLL-741] primary combustion air blower pressure low low
  - 24-FSLL-431 [24-FSLL-902 *at TE, 24-FSLL-901 at AN*] LIC system minimum draft
  - LIC-BLOW-101 [LIC-BLOW-201] primary combustion air

Table D.6. *ANCDF and* TOCDF LIC BMS Circuit Logic

	blower running • Either stage of the ID fan running • 24-FSLL-431 [24-FSLL-902 *at TE, 24-FSLL-901 at AN*] LIC system minimum draft
LIC-FURN-101 [LIC-FURN-201]	
L1-13	The L1-13 circuit will be made when the PLC issues a burner start.
13-3	The 13-3 circuit will be made if all of the following conditions are satisfied: • ZS-134B [ZS-761B] agent block valve XV-134A [XV-761A] closed • ZS-134C [ZS-761C] agent block valve XV-134B [XV-761B] closed • ZS-122B [ZS-747B] primary fuel gas block valve XV-122A [XV-747A] closed • ZS-122C [ZS-747C] primary fuel gas block valve XV-122B [XV-747B] closed • ZS-104B [ZS-204B] block valve XV-104 [XV-204] closed • ZS-105B [ZS-205B *at TE, ZS-726B at AN*] fuel oil block valve XV-105A [XV-205A *at TE, XV-726A at AN*] closed • ZS-105C [ZS-205C *at TE, ZS-726C at AN*] fuel oil block valve XV-105B [XV-205B *at TE, XV-726B at AN*] closed
3-P	The 3-P circuit will be made if all of the following conditions are satisfied: • PSHH-09 [PSHH-748] primary fuel gas pressure switch high high • PSLL-08 [PSLL-*746*] primary fuel gas pressure switch low low • TISHH-612 [TISHH-712] crossover duct refractory temperature high high • TISHH-613 [TISHH-713] secondary chamber exhaust duct refractory temperature high high • PSLL-127B [PSLL-737B] primary burner atomizing air pressure low low • PSLL-44 [PSLL-741] primary combustion air blower pressure low low • 24-FSLL-431 [24-FSLL-902 *at TE, 24-FSLL-901 at AN*] LIC system minimum draft • LIC-BLOW-101 [LIC-BLOW-201] primary combustion air blower running • Either stage of the ID fan running
M-D	The M-D circuit will be made if all of the following conditions are satisfied: • ZS-42B [ZS-743B] primary combustion air flow control valve at low fire • ZS-120A&B [ZS-749A&B] primary fuel gas flow control valve at low fire
D-8	The D-8 circuit will be made if the system purge timer has timed out (see above).

Table D.6. *ANCDF and* TOCDF LIC BMS Circuit Logic

Note:	*(TE only)* To avoid flame-out at high firing rates, the signal from the UV flame detector that monitors the primary burner flame is bypassed and replaced with a signal from a simulated source *(see FAWB Note B-18)*. The bypass occurs when all of the following conditions are satisfied: • FSL-042 [FSL-743] primary combustion air flow above 2300 scfm • TSLLL-610 [TSLLL-710] crossover duct gas temperature above 2000 °F • *Agent block valves have not been closed for more than 60 sec.*
LIC-FURN-102 [LIC-FURN-202]	
L1-13	The L1-13 circuit will be made when the PLC issues a burner start.
13-3	The 13-3 circuit will be made if all of the following conditions are satisfied: • ZS-108B [ZS-792B] secondary fuel gas block valve XV-108A [XV-792A] closed • ZS-108C [ZS-792C] secondary fuel gas block valve XV-108B [XV-792B] closed
3-P	The 3-P circuit will be made if all of the following conditions are satisfied: • PSHH-74 [PSHH-793] secondary fuel gas pressure switch high high • PSLL-73 [PSLL-791] secondary fuel gas pressure switch low low • TISHH-613 [TISHH-713] secondary chamber exhaust duct refractory temperature high high • PSL-58 [PSL-809] process water/spent decon nozzle atomizing air pressure low • ZS-102A [ZS-762A] three-way valve open to process water and ZS-102B [ZS-762B] three-way valve not open to spent decon (note: this requirement is bypassed ten seconds after the secondary burner is lit). • PSL-51 [PSL-265] process water/spent decon pressure low • PSLL-200 [PSLL-795] secondary combustion air blower pressure low low • 24-FSLL-431 [24-FSLL-902 *at TE, 24-FSLL-901 at AN*] LIC system minimum draft • LIC-BLOW-102 [LIC-BLOW-202] secondary combustion air blower running • Either stage of the ID fan running
M-D	The M-D circuit will be made if all of the following conditions are satisfied: • ZS-50B [ZS-788B] secondary combustion air flow control valve at low fire • ZS-70 [ZS-787] secondary fuel gas flow control valve at low fire
D-8	The D-8 circuit will be made if the system purge timer has timed out (see above).

APPENDIX E

Operator Screens

Appendix E contains the *ANCDF and* TOCDF Advisor PC screens associated with operation and control of the LIC furnaces based on the *January 2000 ANCDF control code and the February 2000* TOCDF control code. As Advisor PC screens are generated for PBCDF and UMCDF, they will be included in this appendix. Table E.1 provides an index to the screens.

Table E.1 LIC Furnace System Advisor PC Screens

Figure #	Advisor PC Screen Name	Process Screen
E-1	*TOCDF* LIC Furnace #1, Primary Burner	L1P
E-2	*TOCDF* LIC Furnace #2, Primary Burner	L2P
E-3	*TOCDF* LIC Furnace #1, Secondary Burner	L1S
E-4	*TOCDF* LIC Furnace #2, Secondary Burner	L2S
E-5	*TOCDF* LIC Furnace #1	LF1
E-6	*TOCDF* LIC Furnace #2	LF2
E-7	*TOCDF* LIC #1 Slag Removal Temperature	ST1
E-8	*TOCDF* LIC #2 Slag Removal Temperature	ST2
E-9	*TOCDF* LIC #1 Slag Removal System	SR1
E-10	*TOCDF* LIC #2 Slag Removal System	SR2
E-11	*TOCDF* LIC #1 Agent Stop Feed Status, Page 1	L1SF1
E-12	*TOCDF* LIC #1 Agent Stop Feed Status, Page 2	L1SF2
E-13	*TOCDF* LIC #2 Agent Stop Feed Status, Page 1	L2SF1
E-14	*TOCDF* LIC #2 Agent Stop Feed Status, Page 2	L2SF2
E-15	*TOCDF* LIC #1 RCRA Alarm Summary	RCA
E-16	*TOCDF* LIC #2 RCRA Alarm Summary	RCD
E-17	*ANCDF LIC Furnace, Primary Burner*	*L2P*
E-18	*ANCDF LIC Furnace, Secondary Burner*	*L2S*
E-19	*ANCDF LIC Furnace*	*LF2*
E-20	*ANCDF LIC Slag Removal Temperature*	*ST2*
E-21	*ANCDF LIC Slag Removal System*	*ST2*
E-22	*ANCDF LIC Agent Stop Feed Status, Page 1*	*L2SF1*
E-23	*ANCDF LIC Agent Stop Feed Status, Page 2*	*L2SF2*
E-24	*ANCDF LIC RCRA Alarm Summary*	*RCD*

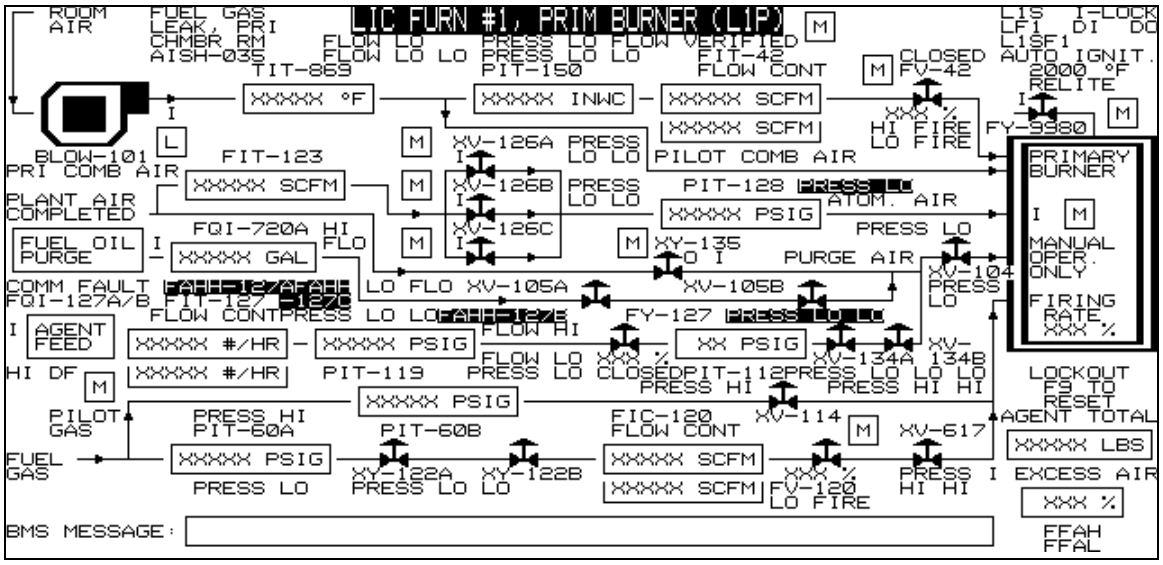


Figure E-1. TOCDF Advisor PC Screen LIC Furnace #1, Primary Burner (L1P)

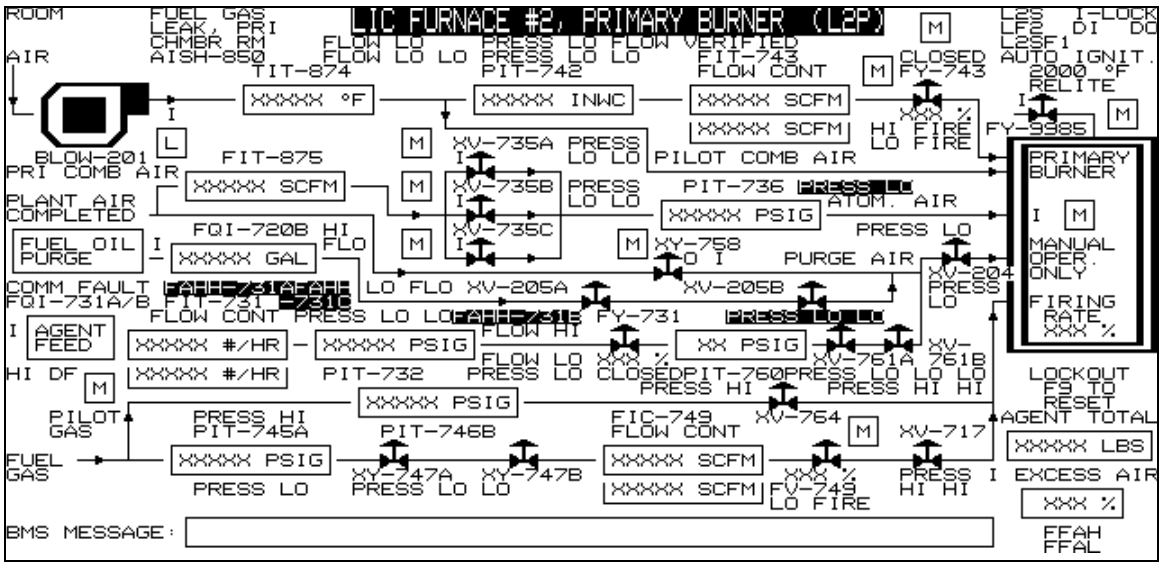


Figure E-2. TOCDF Advisor PC Screen LIC Furnace #2, Primary Burner (L2P)

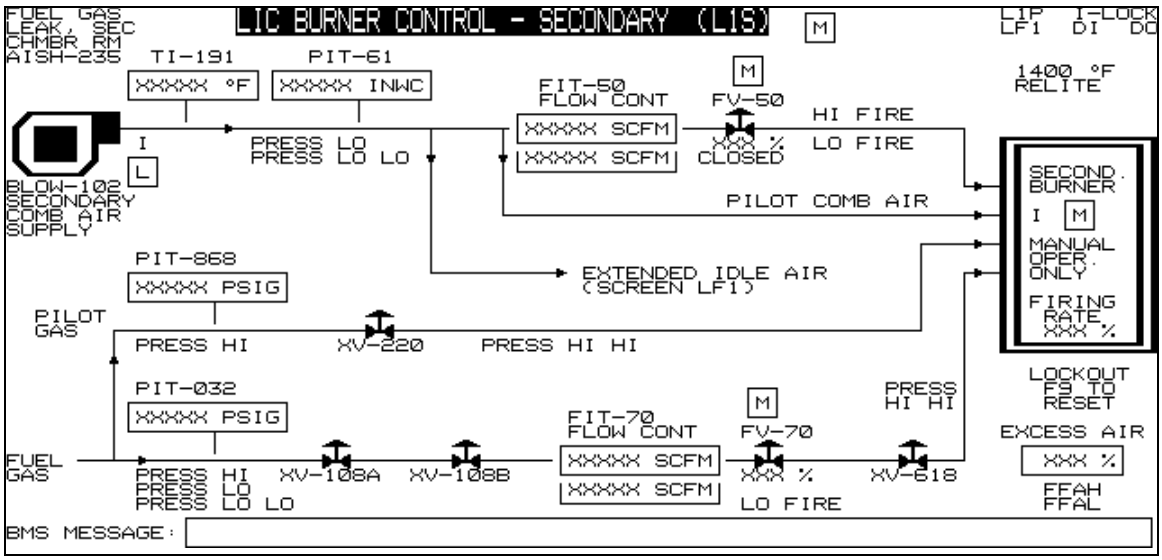


Figure E-3. TOCDF Advisor PC Screen LIC Furnace #1, Secondary Burner (L1S)

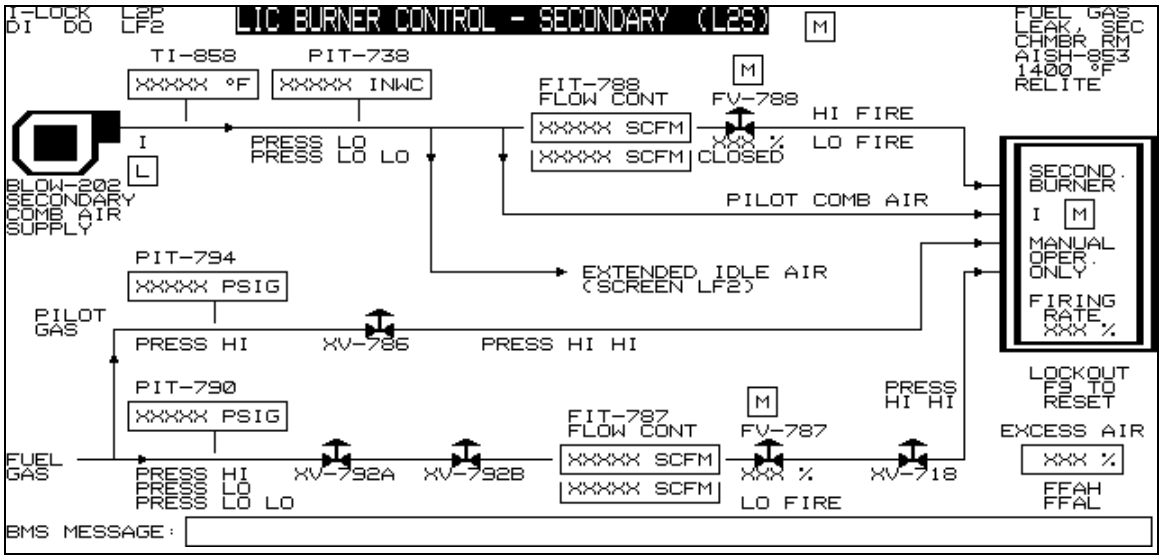


Figure E-4. TOCDF Advisor PC Screen LIC Furnace #2, Secondary Burner (L2S)

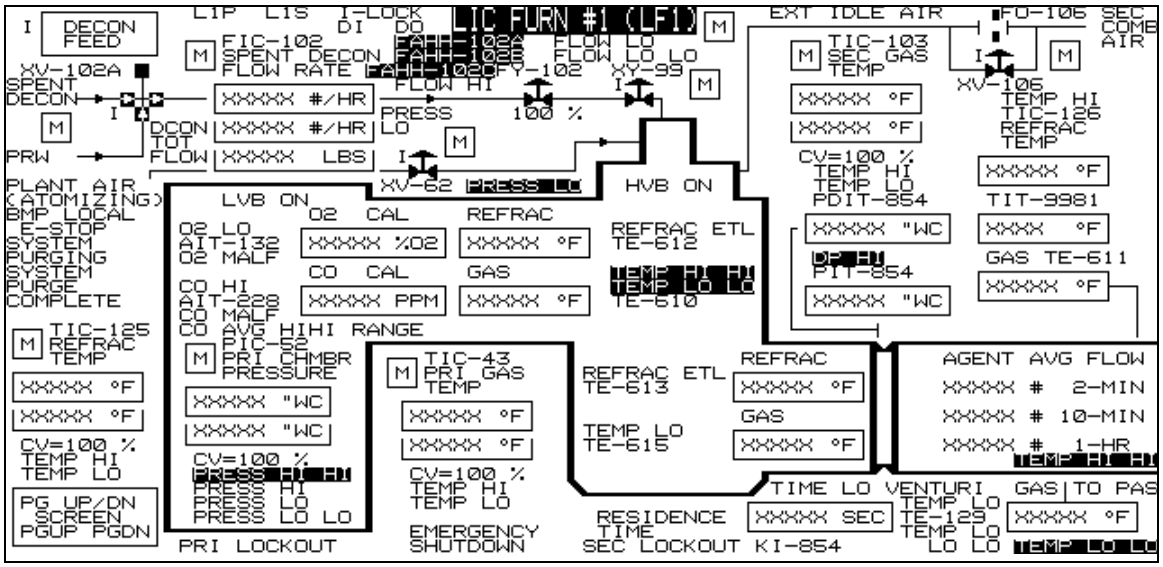


Figure E-5. TOCDF Advisor PC Screen LIC Furnace #1 (LF1)

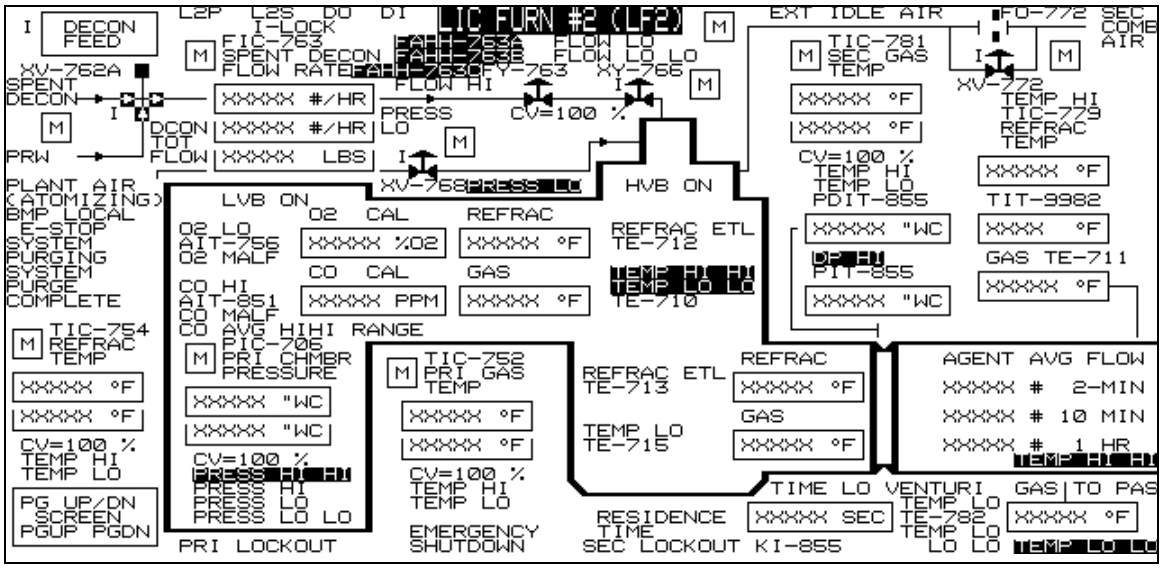


Figure E-6. TOCDF Advisor PC Screen LIC Furnace #2 (LF2)

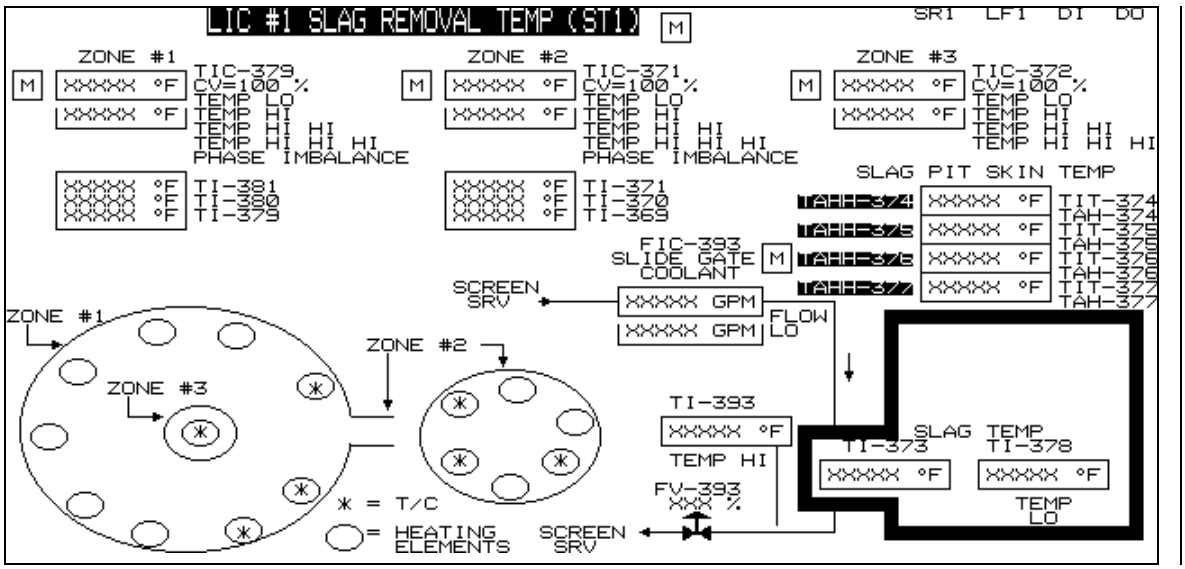


Figure E-7. TOCDF Advisor PC Screen LIC #1 Slag Removal Temperature (ST1)

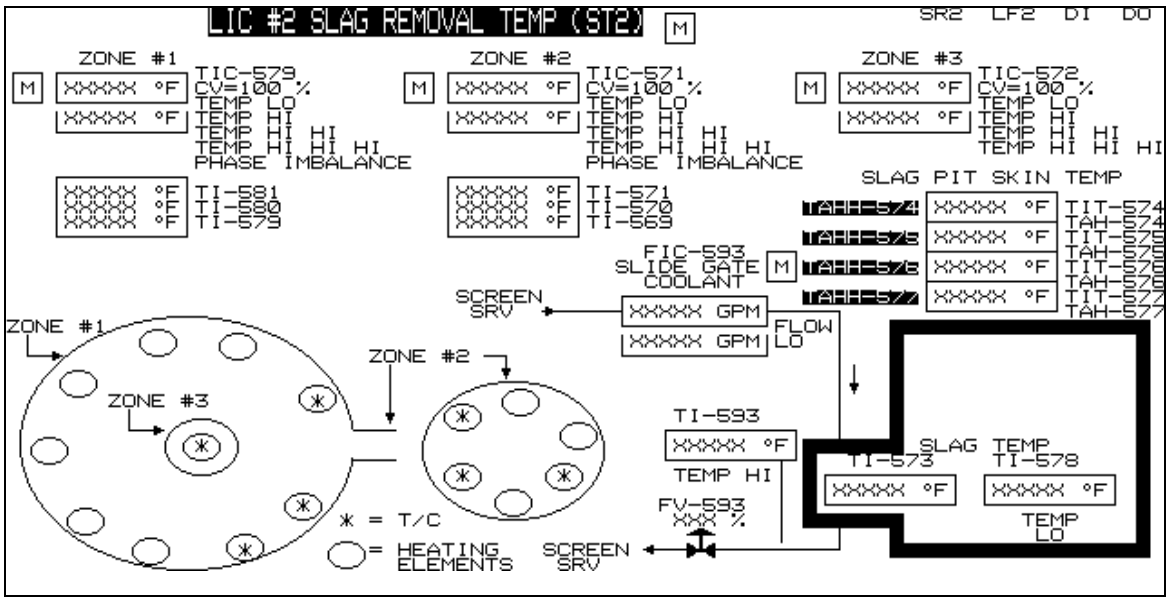


Figure E-8. TOCDF Advisor PC Screen LIC #2 Slag Removal Temperature (ST2)

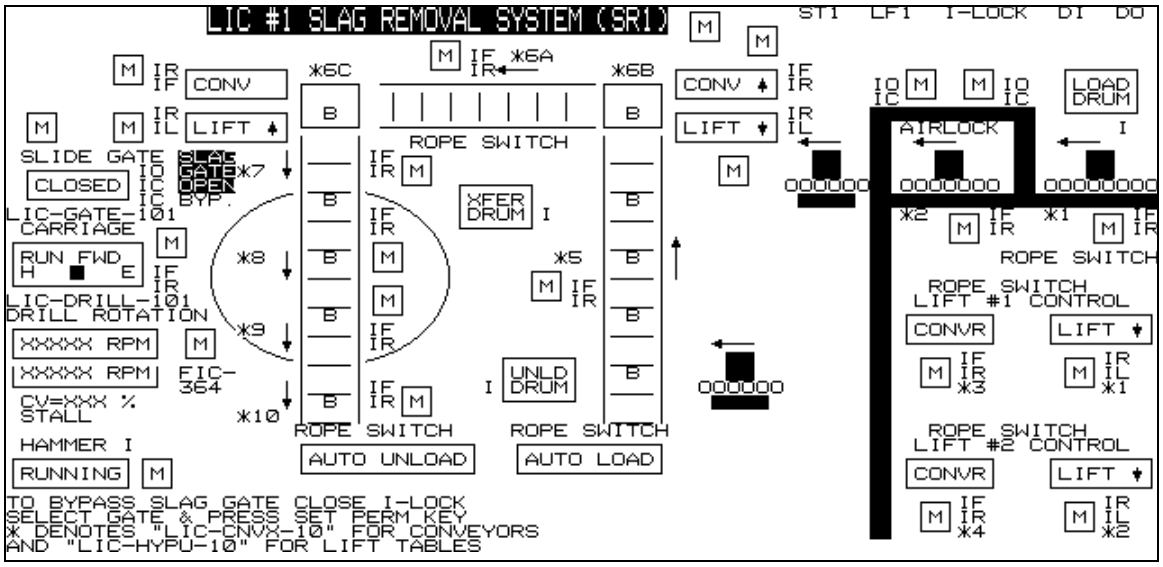


Figure E-9. TOCDF Advisor PC Screen LIC #1 Slag Removal System (SR1)

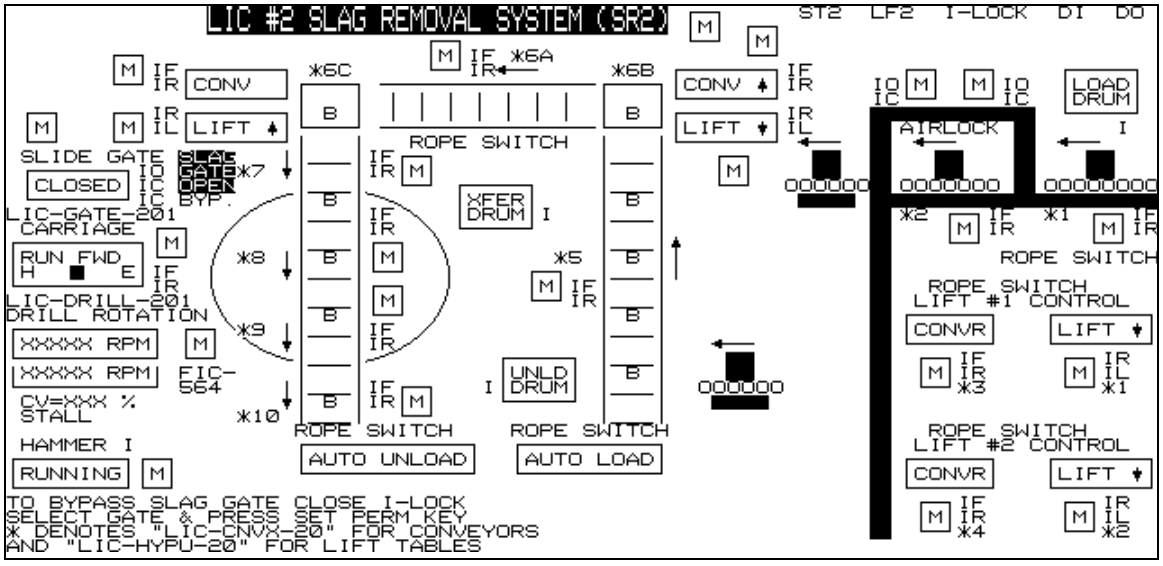


Figure E-10. TOCDF Advisor PC Screen LIC #2 Slag Removal System (SR2)

LIC1 AGENT STOP FEED STATUS (L1SF1) PG 1 OF 2 L1SF2 L1P

13-AISH-035	13-BSLL-912		24-BLOW-104 B
#01 PRI GAS LEAK	#18 PRI BMS LCKOUT	#35	#52 2ND STAGE ALM
13-AAH-083	13-KAL-854	24-PAS-704 AR	24-TSH-450 A/B
#02 EXH AVG CO	#19 GAS RESID TIME	#36 DUCT ACAMS ALM	#53 1ST STG BEARNG
13-XS-083/078	13-FDAH-127		13-XY-134 A
#03 EXH CO MALF	#20 AGT FLOW DEVIT	#37	#54 AGNT VLV A ALM
13-AAH-078H	13-PDAH-854	24-ASH-210	24-TSH-058 A/F
#04 EXH R-AVG CO	#21 VENTURI PRESS	#38 GAS TO STAC O2	#55 2ND STAGE TEMP
	71-XS-CONS		13-XY-134 B
#05	#22 CONSOLE E-STOP	#39	#56 AGNT VLV B ALM
13-PSLL-112	13-XS-925	24-IAL-388	13-TSLL-129
#06 AGT FEED PRES	#23 E-STOP AT BMP	#40 2ND STAGE CURR	#57 FURN VENTURI
13-PSLL-127 A	24-XSH-079	24-IAH-388	13-PSHH-233
#07 AGT ATM AIR	#24 2ND STAGE VIB	#41 2ND STAGE CURR	#58 PRI CHAMB PRES
13-PSLL-127 B	24-FIC-088	24-TSHHH-396	24-TSH-451 A/B
#08 AGT ATM AIR	#25 BRIN TO VENTUR	#42 QUENCH TEMP.	#59 2ND STG BEARNG
13-PSLL-127 C	24-TSHH-089	24-LSLL-411	PAS701
#09 AGT ATM AIR	#26 QUENCH EXH TEM	#43 SCRUBBER BED	#60 COM STACK ACAM
13-PAL-128	24-LSLL-099	13-FIT-102	24-PIT-129
#10 AGT ATM AIR	#27 SCRUBBER SUMP	#44 DEC/H2O H-H FL	#61 CLEAN LIQ PUMP
13-TSLL-129	24-PDIC-090	24-PSLL-659	24-PDIT-147
#11 VENTURI TEMP	#28 VENTURI D/P	#45 FAN LUBE OIL	#62 DEMISTER CANDL
13-ASL-229	24-LSHH-114	24-FISLL-661	24-FALL-112
#12 SEC O2	#29 SCRUBBER SUMP	#46 1ST STAGE OIL	#63 CLEAN LIQ FLOW
13-XS-229/210	24-AALL-091	24-FISLL-662	23-BRA-TNKS
#13 SEC O2 MALF	#30 BRINE PH LO LO	#47 2ND STAGE OIL	#64 BRA TANKS
13-AISH-235	24-LSLL-660	24-TSH-980 A/F	13-PSL-058
#14 SEC GAS LEAK	#31 FANS LUBE OIL	#48 1ST STAGE TEMP	#65 DECON ATM AIR
13-TSLL-610	24-LAHH-132	24-IAH-981	24-DIC-083
#15 PRI EXH TEMP	#32 QUENCH SUMP	#49 1ST STAGE CURR	#66 BRIN DENS HI-H
13-FIC-127	24-IAL-981	24-XSH-982	24-PIT-129
#16 AGT FEED HI-HI	#33 1ST STAGE CURR	#50 1ST STAGE VIB	#67 LIQ DISCH LO-L
13-BSLL-909	24-FSLL-431	24-BLOW-104 A	24-PAS-OK
#17 SEC BMS LCKOUT	#34 PAS LO AIR FLW	#51 1ST STAGE ALM	#68 LIC1 PAS NORML

Figure E-11. TOCDF Advisor PC Screen LIC #1 Agent Stop Feed Status, Page 1 (L1SF1)

LIC1 AGENT STOP FEED STATUS (L1SF2) PG 2 OF 2 L1SF1 L1P

13-HS-XXX	13-TAHH-374		
#01 EX AIR CV>= 70	#18 SLAG SKIN TEMP	#35	#52
13-PALL-112	13-TAHH-375		
#02 AGT PRESS LOLO	#19 SLAG SKIN TEMP	#36	#53
13-FAHH-127	13-TAHH-376		
#03 AGT R-FLOW H-H	#20 SLAG SKIN TEMP	#37	#54
13-ZS-367 B	13-TAHH-377		
#04 SLAG GATE OPEN	#21 SLAG SKIN TEMP	#38	#55
13-TAHH-610			
#05 PRI EXH HI HI	#22	#39	#56
13-TAHH-129			
#06 SEC EXH HI HI	#23	#40	#57
24-PALL-100			
#07 BRI DISCH LOLO	#24	#41	#58
HS-210,229			
#08 EXH O2 IN CAL	#25	#42	#59
HS-078,083			
#09 EXH CO IN CAL	#26	#43	#60
24-AAL-210			
#10 STACK O2 LO LO	#27	#44	#61
13-AAH-229			
#11 EXH O2 HI HI	#28	#45	#62
24-ZS-750 B			
#12 PAS BLEED OPEN	#29	#46	#63
24-AI-091A&B			
#13 PH BOTH IN CAL	#30	#47	#64
24-TAHH-397			
#14 QNCH TWR HI HI	#31	#48	#65
24-TAHHH-397			
#15 QNCH HI HI HI	#32	#49	#66
13-FALL-042			
#16 C.A. FLOW LOLO	#33	#50	#67
#17	#34	#51	#68

Figure E-12. TOCDF Advisor PC Screen LIC #1 Agent Stop Feed Status, Page 2 (L1SF2)

LIC2 AGENT STOP FEED STATUS (L2SF1) PG 1 OF 2 L2SF2 L2P

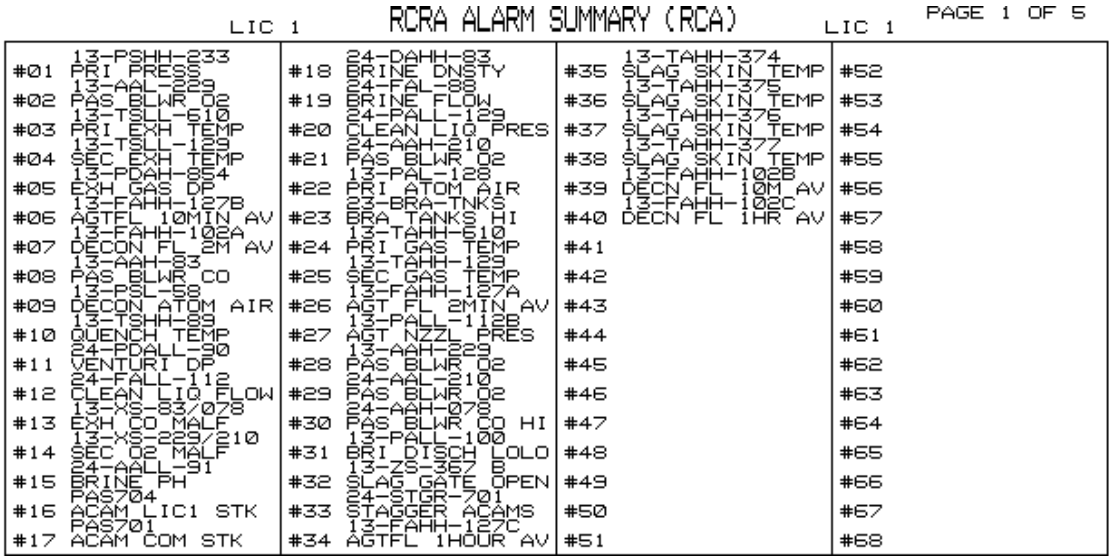
#01	13-AISH-850	#18	13-BSLL-913	#35		#52	24-BLOW-204 B
#02	13-AAH-778	#19	13-KAL-855	#36	24-PAS-705 AR	#53	24-TSH-452 A/B
#03	13-XS-778/716	#20	13-FDAH-731	#37		#54	13-XY-761 A
#04	13-AAH-716H	#21	13-PDAH-855	#38	24-ASH-717	#55	24-TSH-711 A/F
#05		#22	71-XS-CONS	#39		#56	13-XY-761 B
#06	13-PSLL-760	#23	13-XS-926	#40	24-IAL-710	#57	13-TSLLL-782
#07	13-PSLL-737 A	#24	24-XSH-709	#41	24-IAH-710	#58	13-PSHH-845
#08	13-PSLL-737 B	#25	24-FIC-828	#42	24-TSHHH-817	#59	24-TSH-453 A/B
#09	13-PSLL-737 C	#26	24-TSHH-800	#43	24-LSLL-821	#60	PAS701A/B/C
#10	13-PAL-736	#27	24-LSLL-820	#44	13-FIT-763	#61	24-PIT-839
#11	13-TSLL-782	#28	24-PDIC-814	#45	24-PSLL-719	#62	24-PDIT-867
#12	13-ASL-798	#29	24-LSHH-819	#46	24-FISLL-707	#63	24-FALL-825
#13	13-XS-798/717	#30	24-AALL-831	#47	24-FISLL-708	#64	23-BRA-TNKS
#14	13-AISH-853	#31	24-LSLL-721	#48	24-TSH-976 A/F	#65	24-PAS-OK
#15	13-TSLL-710	#32	24-LAHH-810	#49	24-IAH-977	#66	24-DIC-835
#16	13-FIC-731	#33	24-IAL-977	#50	24-XSH-978	#67	24-PIT-839
#17	13-BSLL-908	#34	24-FSLL-902	#51	24-BLOW-204 A	#68	24-PAS-OK

Figure E-13. TOCDF Advisor PC Screen LIC #2 Agent Stop Feed Status, Page 1 (L2SF1)

LIC2 AGENT STOP FEED STATUS (L2SF2) PG 2 OF 2 L2SF1 L2P

#01	13-HS-XXX EX AIR CV>= 70	#18	13-TAHH-574 SLAG SKIN TEMP	#35		#52	
#02	13-PALL-760 AGT PRESS LOLO	#19	13-TAHH-575 SLAG SKIN TEMP	#36		#53	
#03	13-FAHH-731 AGT R-FLOW H-H	#20	13-TAHH-576 SLAG SKIN TEMP	#37		#54	
#04	13-ZS-567 B SLAG GATE OPEN	#21	13-TAHH-577 SLAG SKIN TEMP	#38		#55	
#05	13-TAHH-710 PRI EXH HI HI	#22		#39		#56	
#06	13-TAHH-782 SEC EXH HI HI	#23		#40		#57	
#07	24-PALL-838 BRI DISCH LOLO	#24		#41		#58	
#08	13-HS-798,-717 EXH O2 IN CAL	#25		#42		#59	
#09	13-HS-778,716 EXH CO IN CAL	#26		#43		#60	
#10	24-AAL-717 STACK O2 LO LO	#27		#44		#61	
#11	13-AAH-798 EXH O2 HI HI	#28		#45		#62	
#12	24-ZS-753 B PAS BLEED OPEN	#29		#46		#63	
#13	24-AI-831A&B PH BOTH IN CAL	#30		#47		#64	
#14	13-FIT-743 C A FLOW LOLO	#31		#48		#65	
#15	24-TAHH-816 QNCH TWR OVHD	#32		#49		#66	
#16	24-TAHHH-816 QNCH TWR OVHD	#33		#50		#67	
#17		#34		#51		#68	

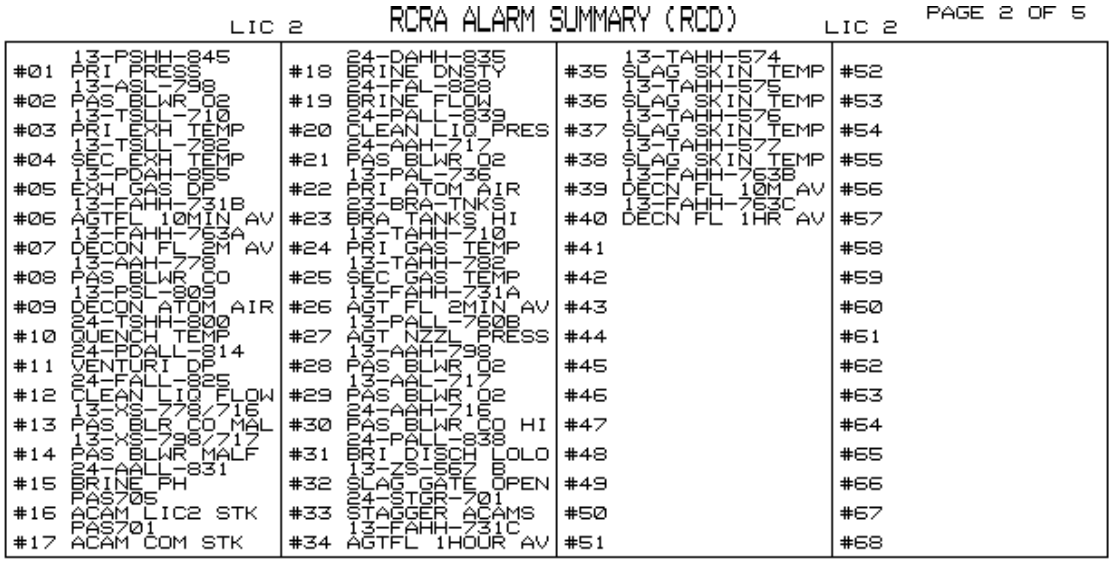
Figure E-14. TOCDF Advisor PC Screen LIC #2 Agent Stop Feed Status, Page 2 (L2SF2)



LIC 1 RCRA ALARM SUMMARY (RCA) LIC 1 PAGE 1 OF 5

13-PSHH-233	24-DAHH-83	13-TAHH-374	
#01 PRI PRESS	#18 BRINE DNSTY	#35 SLAG SKIN TEMP	#52
13-AAL-229	24-FAL-88	13-TAHH-375	
#02 PAS BLWR O2	#19 BRINE FLOW	#36 SLAG SKIN TEMP	#53
13-TSLL-610	24-PALL-129	13-TAHH-376	
#03 PRI EXH TEMP	#20 CLEAN LIQ PRES	#37 SLAG SKIN TEMP	#54
13-TSLL-129	24-AAH-210	13-TAHH-377	
#04 SEC EXH TEMP	#21 PAS BLWR O2	#38 SLAG SKIN TEMP	#55
13-PDAH-884	13-PAL-128	13-FAHH-102B	
#05 EXH GAS DP	#22 PRI ATOM AIR	#39 DECN FL 10M AV	#56
13-FAHH-127B	23-BRA-TNKS	13-FAHH-102C	
#06 AGTFL 10MIN AV	#23 BRA TANKS HI	#40 DECN FL 1HR AV	#57
13-FAHH-102A	13-TAHH-610		
#07 DECON FL 2M AV	#24 PRI GAS TEMP	#41	#58
13-AAH-83	13-TAHH-129		
#08 PAS BLWR CO	#25 SEC GAS TEMP	#42	#59
13-PSL-58	13-FAHH-127A		
#09 DECON ATOM AIR	#26 AGT FL 2MIN AV	#43	#60
13-TSHH-89	13-PALL-112B		
#10 QUENCH TEMP	#27 AGT NZZL PRES	#44	#61
24-PDALL-90	13-AAH-229		
#11 VENTURI DP	#28 PAS BLWR O2	#45	#62
24-FALL-112	24-AAL-210		
#12 CLEAN LIQ FLOW	#29 PAS BLWR O2	#46	#63
13-XS-83/078	24-AAH-078		
#13 EXH CO MALF	#30 PAS BLWR CO HI	#47	#64
13-XS-229/210	13-PALL-100		
#14 SEC O2 MALF	#31 BRI DISCH LOLO	#48	#65
24-AALL-91	13-ZS-367 B		
#15 BRINE PH	#32 SLAG GATE OPEN	#49	#66
PAS704	24-STGR-701		
#16 ACAM LIC1 STK	#33 STAGGER ACAMS	#50	#67
PAS701	13-FAHH-127C		
#17 ACAM COM STK	#34 AGTFL 1HOUR AV	#51	#68

Figure E-15. TOCDF Advisor PC Screen LIC #1 RCRA Alarm Summary (RCA)



LIC 2 RCRA ALARM SUMMARY (RCD) LIC 2 PAGE 2 OF 5

13-PSHH-845	24-DAHH-835	13-TAHH-574	
#01 PRI PRESS	#18 BRINE DNSTY	#35 SLAG SKIN TEMP	#52
13-ASL-798	24-FAL-888	13-TAHH-575	
#02 PAS BLWR O2	#19 BRINE FLOW	#36 SLAG SKIN TEMP	#53
13-TSLL-710	24-PALL-839	13-TAHH-576	
#03 PRI EXH TEMP	#20 CLEAN LIQ PRES	#37 SLAG SKIN TEMP	#54
13-TSLL-782	24-AAH-717	13-TAHH-577	
#04 SEC EXH TEMP	#21 PAS BLWR O2	#38 SLAG SKIN TEMP	#55
13-PDAH-855	13-PAL-736	13-FAHH-763B	
#05 EXH GAS DP	#22 PRI ATOM AIR	#39 DECN FL 10M AV	#56
13-FAHH-731B	23-BRA-TNKS	13-FAHH-763C	
#06 AGTFL 10MIN AV	#23 BRA TANKS HI	#40 DECN FL 1HR AV	#57
13-FAHH-763A	13-TAHH-710		
#07 DECON FL 2M AV	#24 PRI GAS TEMP	#41	#58
13-AAH-778	13-TAHH-782		
#08 PAS BLWR CO	#25 SEC GAS TEMP	#42	#59
13-PSL-809	13-FAHH-731A		
#09 DECON ATOM AIR	#26 AGT FL 2MIN AV	#43	#60
24-TSHH-800	13-PALL-760B		
#10 QUENCH TEMP	#27 AGT NZZL PRESS	#44	#61
24-PDALL-814	13-AAH-798		
#11 VENTURI DP	#28 PAS BLWR O2	#45	#62
24-FALL-825	13-AAL-717		
#12 CLEAN LIQ FLOW	#29 PAS BLWR O2	#46	#63
13-XS-778/716	24-AAH-718		
#13 PAS BLR CO MAL	#30 PAS BLWR CO HI	#47	#64
13-XS-798/717	24-PALL-838		
#14 PAS BLWR MALF	#31 BRI DISCH LOLO	#48	#65
24-AALL-831	13-ZS-567 B		
#15 BRINE PH	#32 SLAG GATE OPEN	#49	#66
PAS705	24-STGR-701		
#16 ACAM LIC2 STK	#33 STAGGER ACAMS	#50	#67
PAS701	13-FAHH-731C		
#17 ACAM COM STK	#34 AGTFL 1HOUR AV	#51	#68

Figure E-16 TOCDF Advisor PC Screen LIC #2 RCRA Alarm Summary (RCD)

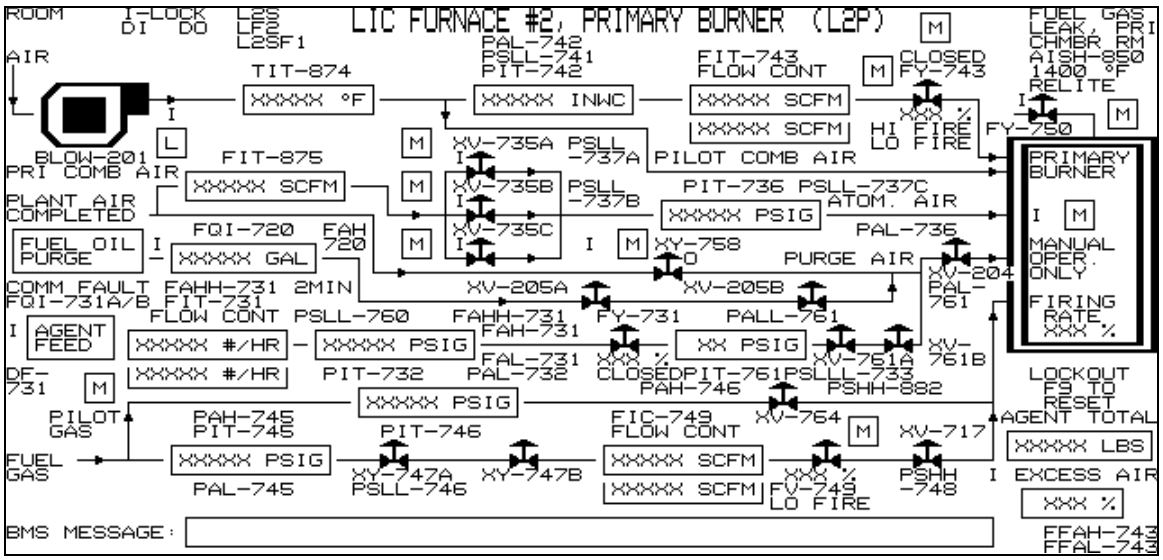


Figure E-17 ANCDF Advisor PC Screen LIC Furnace, Primary Burner (L2P)

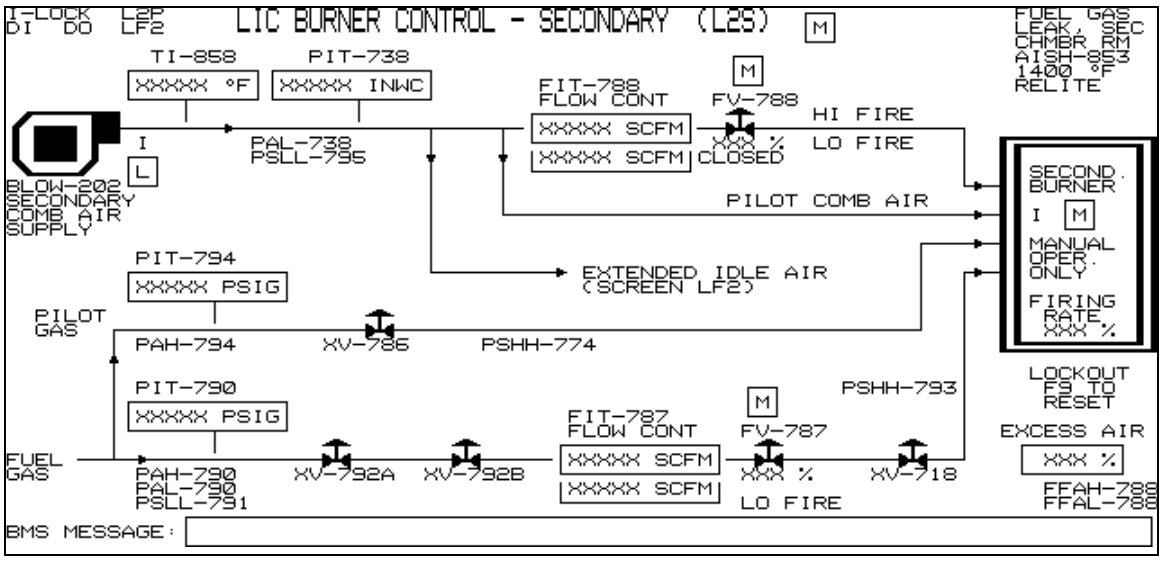


Figure E-18 ANCDF Advisor PC Screen LIC Furnace, Secondary Burner (L2S)

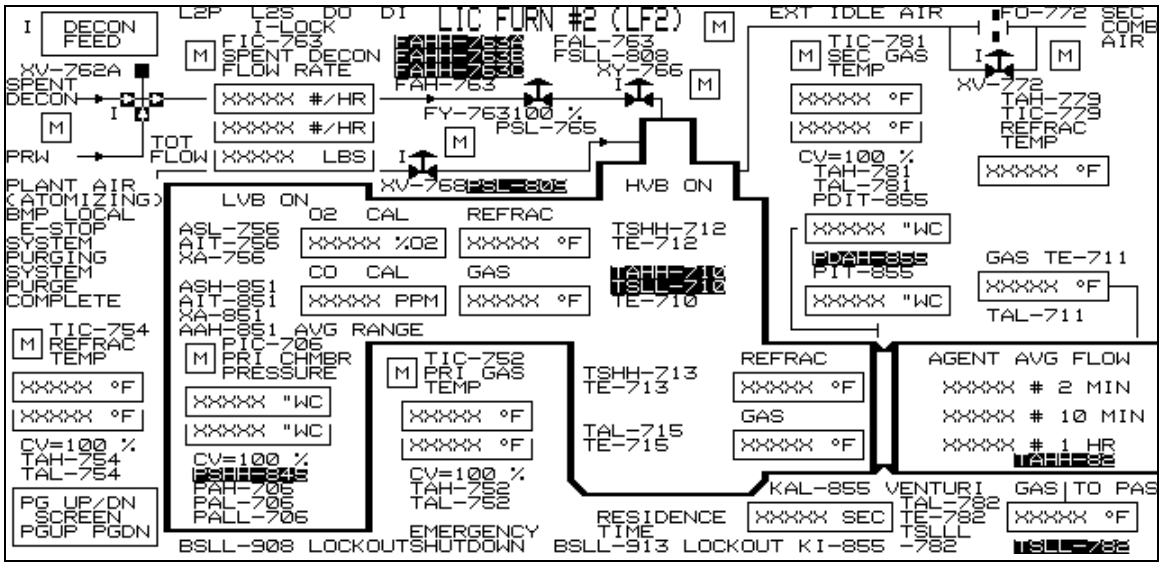


Figure E-19 ANCDF Advisor PC Screen LIC Furnace (LF2)

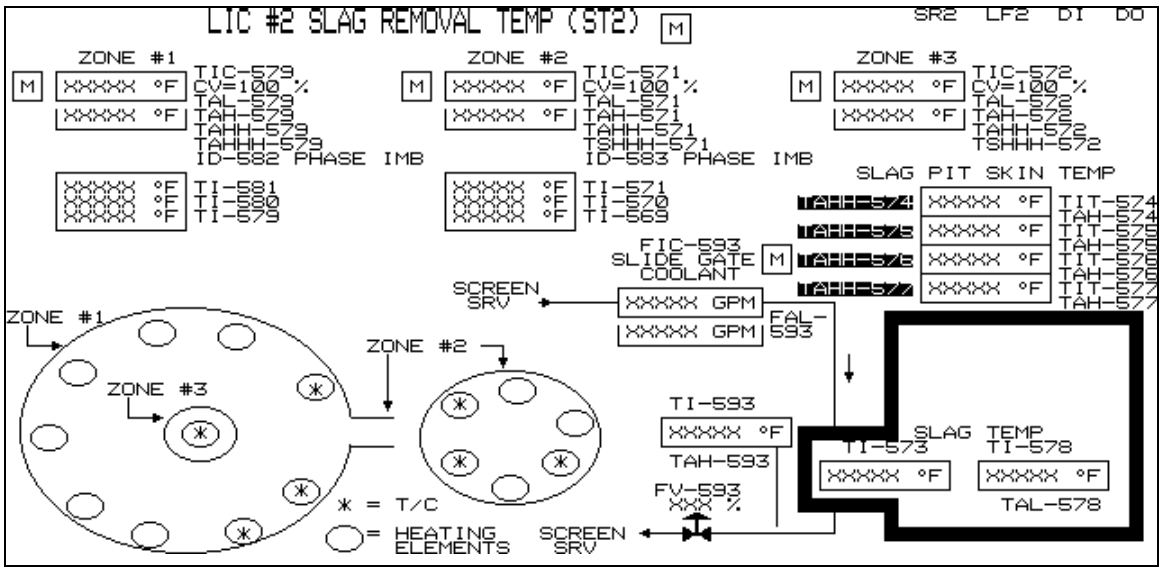


Figure E-20 ANCDF Advisor PC Screen LIC Slag Removal Temperature (ST2)

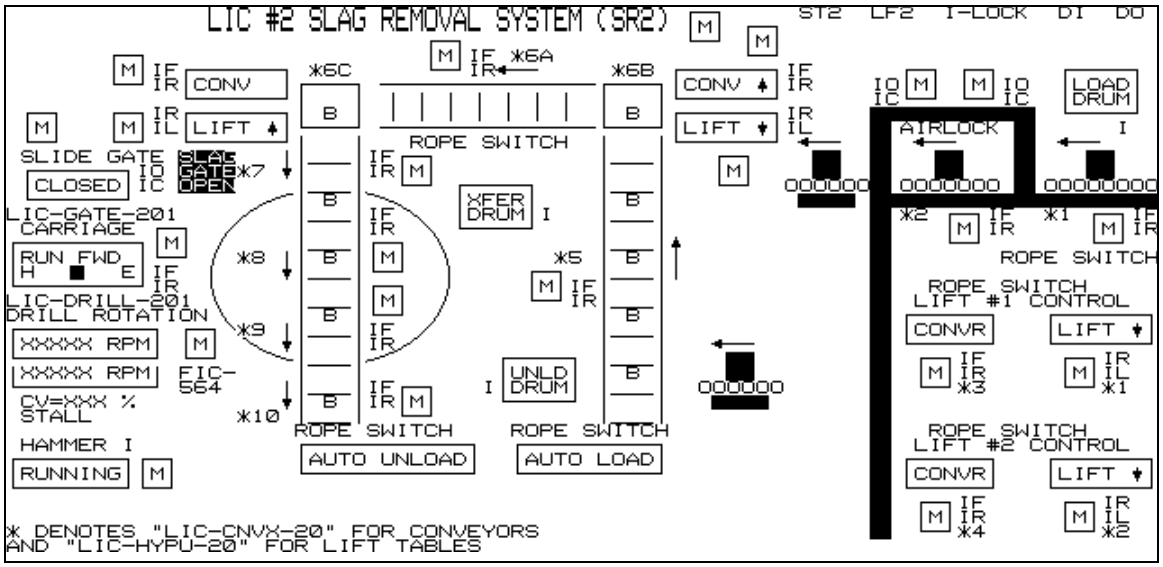


Figure E-21 ANCDF Advisor PC Screen LIC Slag Removal System (SR2)

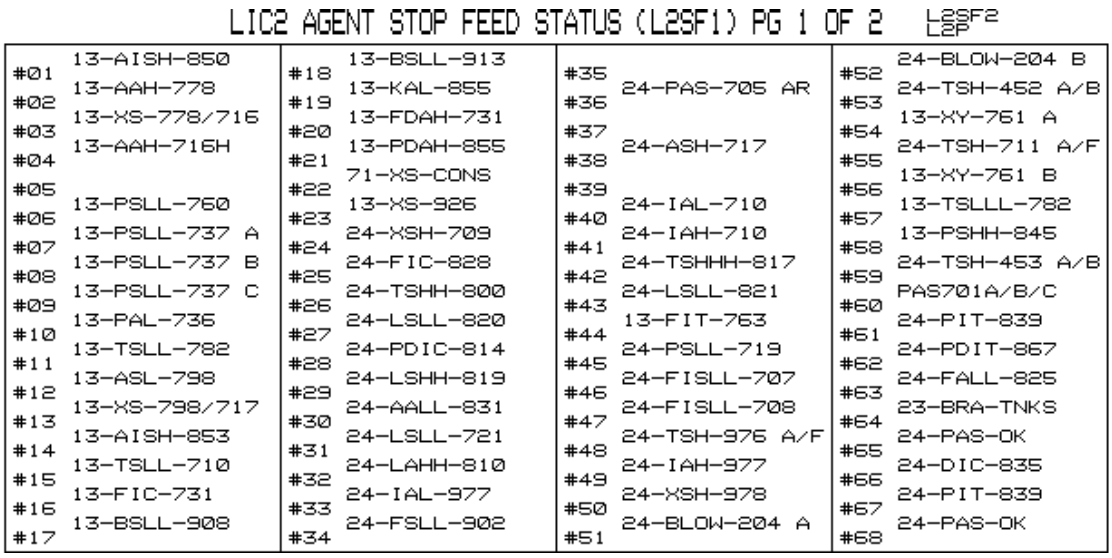


Figure E-22 ANCDF Advisor PC Screen LIC Agent Stop Feed Status, Page 1 (L2SF1)

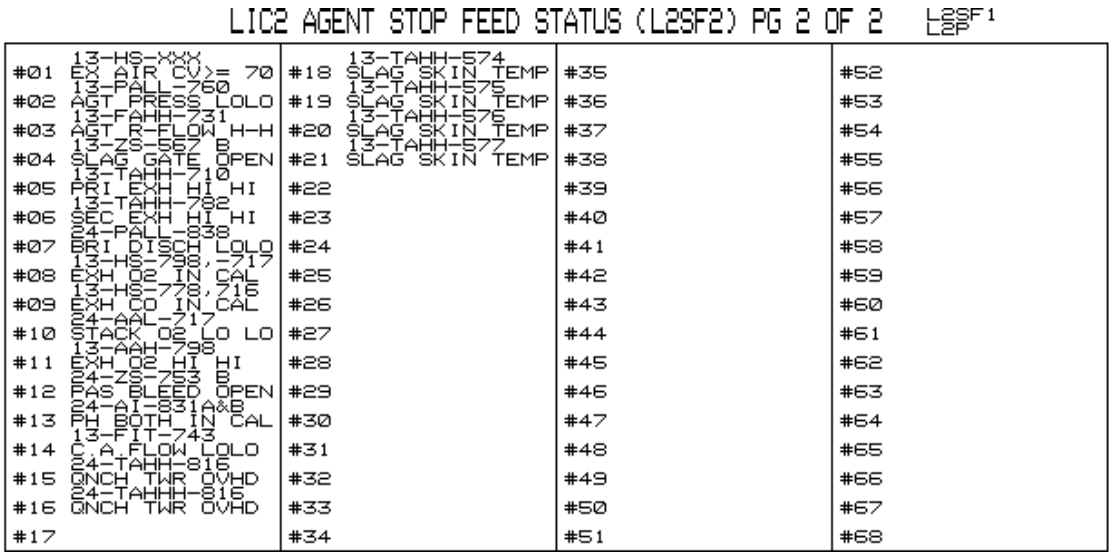


Figure E-23 ANCDF Advisor PC Screen LIC Agent Stop Feed Status, Page 2 (L2SF2)

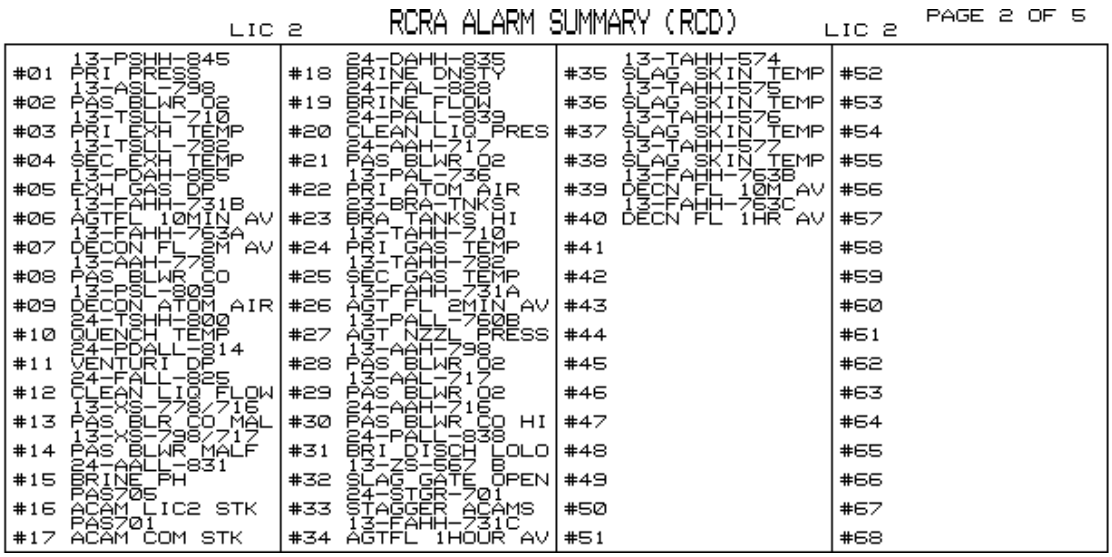


Figure E-24 ANCDF Advisor PC Screen LIC RCRA Alarm Summary (RCD)

APPENDIX F

Instrument Ranges

Table F.1 shows the instrument data extracted from the TOCDF Loveland calibration database as of *March 1999.* Not all instrument tag numbers listed are part of the design at ANCDF, PBCDF, and UMCDF.

Table F.1 TOCDF Loveland Instrument Calibration Database[1]

INSTRUMENT TAG	RCRA	INPUT			OUTPUT			SET POINT	LOOP DEFINITION
		LOW	HI	UNIT	LOW	HI	UNIT		
13-FIT-042	No	0	6	in. wc.	4	20	mA		LIC-FURN-101 Comb. Air
13-FIT-050	No	0	15	in. wc.	4	20	mA		LIC-FURN-102 Comb. Air
13-FIT-070	No	0	20.071	in. wc.	4	20	mA		LIC-FURN-102 Fuel Gas
13-FIT-120	No	0	30	in. wc.	4	20	mA		LIC-FURN-101 Fuel Gas
13-FIT-123	No	0	10	in. wc.	4	20	mA		LIC-FURN-101 Atomizing Air
13-FIT-393	No	0	100	in. wc.	4	20	mA		Coolant to LIC-FURN-102 SRS Slide Gate
13-FIT-593	No	0	100	in. wc.	4	20	mA		Coolant to LIC-FURN-202 SRS Slide Gate
13-FIT-743	No	0	6	in. wc.	4	20	mA		LIC-FURN-201 Comb. Air
13-FIT-749	No	0	30	in. wc.	4	20	mA		LIC-FURN-201 Fuel Gas
13-FIT-787	No	0	20.071	in. wc.	4	20	mA		LIC-FURN-202 Fuel Gas
13-FIT-788	No	0	15	in. wc.	4	20	mA		LIC-FURN-202 Comb. Air
13-FIT-875	No	0	10	in. wc.	4	20	mA		LIC-FURN-201 Atomizing Air
13-FSL-042	No	4	20	mA	0	0		14.11	LIC-FURN-101 Comb. Air
13-FSL-743	No	4	20	mA	0	4,732	acfm	14.6	LIC-FURN-201 Comb. Air
13-FY-127C	No	4	20	mA	3	15	psig		LIC-FURN-101 Agent Feed
13-FY-731C	No	4	20	mA	3	15	psig		LIC-FURN-201 Agent Feed

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT LOW	INPUT HI	INPUT UNIT	OUTPUT LOW	OUTPUT HI	OUTPUT UNIT	SET POINT	LOOP DEFINITION
13-PDIT-854	Yes	-2	1.75	in. wc.	4	20	mA		LIC-FURN-102 Exhaust
13-PDIT-855	Yes	-2	1.75	in. wc.	4	20	mA		LIC-FURN-202 Exhaust
13-PIT-032	No	0	4	psig	4	20	mA		LIC-FURN-102 Fuel Gas Supply
13-PIT-052	No[2]	-20	5	in. wc.	4	20	mA		LIC-FURN-101 Primary Chamber
13-PIT-060A	No	0	7	psig	4	20	mA		LIC-FURN-101 Fuel Gas Supply
13-PIT-060B	No	0	3	psig	4	20	mA		LIC-FURN-101 Fuel Gas Supply to Pilot
13-PIT-061	No	0	100	in. wc.	4	20	mA		LIC-BLOW-102 Discharge
13-PIT-112	Yes	0	25	psig	4	20	mA		LIC-FURN-101 Agent Feed
13-PIT-119	No	0	200	psig	4	20	mA		LIC-FURN-101 Agent Feed
13-PIT-128	*Yes*	0	200	psig	4	20	mA		LIC-FURN-101 Atomizing Air
13-PIT-150	No	0	100	in. wc.	4	20	mA		LIC-BLOW-101 Discharge
13-PIT-706	No[2]	-20	5	in. wc.	4	20	mA		LIC-FURN-201 Primary Chamber
13-PIT-732	No	0	200	psig	4	20	mA		LIC-FURN-201 Agent Feed
13-PIT-736	*Yes*	0	200	psig	4	20	mA		LIC-FURN-201 Atomizing Air
13-PIT-738	No	0	100	in. wc.	4	20	mA		LIC-BLOW-202 Discharge
13-PIT-742	No	0	100	in. wc.	4	20	mA		LIC-BLOW-201 Discharge
13-PIT-745	No	0	7	psi	4	20	mA		LIC-FURN-201 Fuel Gas Supply
13-PIT-746B	No	0	3	psig	4	20	mA		LIC-FURN-201 Fuel Gas Supply to Pilot
13-PIT-760	Yes	0	25	psig	4	20	mA		LIC-FURN-201 Agent Feed
13-PIT-790	No	0	4	psig	4	20	mA		LIC-FURN-202 Fuel Gas Supply
13-PIT-794	No	0	3	psig	4	20	mA		LIC-FURN-202 Pilot Fuel Gas
13-PIT-854	No	-8	2	in. wc.	4	20	mA		LIC-FURN-102 Exhaust

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT			OUTPUT			SET POINT	LOOP DEFINITION
		LOW	HI	UNIT	LOW	HI	UNIT		
13-PIT-855	No	-8	2	in. wc.	4	20	mA		LIC-FURN-202 Exhaust
13-PIT-868	No	0	3	psig	4	20	mA		LIC-FURN-102 Pilot Fuel Gas
13-PSHH-009	No	0.5	6	psig	0	0		4.75	LIC-FURN-101 Fuel Gas
13-PSHH-074	No	0.5	6	psig	0	0		3.75	LIC-FURN-102 Fuel Gas
13-PSHH-233	Yes	0.5	-0.5	in. wc.	0	0		-0.25	LIC-FURN-101 Primary Chamber
13-PSHH-748	No	0.5	6	psig	0	0		4.75	LIC-FURN-201 Fuel Gas
13-PSHH-774	No	0.5	6	psig	0	0		2.75	LIC-FURN-202 Pilot Fuel Gas
13-PSHH-793	No	0.5	6	psig	0	0		3.75	LIC-FURN-202 Fuel Gas
13-PSHH-845	Yes	-5	5	in. wc.	0	0		-0.25	LIC-FURN-201 Primary Chamber
13-PSHH-866	No	0.5	6	psig	0	0		2.75	LIC-FURN-102 Pilot Fuel Gas
13-PSHH-873	No	0.5	6	psig	0	0		2.75	LIC-FURN-101 Fuel Gas to Mixer
13-PSHH-882	No	0.5	6	psig	0	0		2.75	LIC-FURN-201 Fuel Gas to Mixer
13-PSL-051	No	15	100	psig	0	0		45	LIC-FURN-102 Spent Decon
13-PSL-058	Yes	12	100	psig	0	0		*60*	LIC-FURN-102 Atomizing Air
13-PSL-765	No	15	100	psig	0	0		45	LIC-FURN-202 Spent Decon
13-PSL-809	Yes	12	100	psig	0	0		*60*	LIC-FURN-202 Atomizing Air
13-PSLL-008	No	0.5	6	psig	0	0		1.5	LIC-FURN-101 Fuel Gas
13-PSLL-044	No	10	45	in. wc.	0	0		20	LIC-BLOW-101 Discharge
13-PSLL-073	No	0.5	6	psig	0	0		1.5	LIC-FURN-102 Fuel Gas Supply
13-PSLL-112	No	0	100	psig	0	0		20	LIC-FURN-101 Agent Feed
13-PSLL-127A	No[2]	2	25	psig	0	0		12	LIC-FURN-101 Atomizing Air
13-PSLL-127B	No	2	8	psig	0	0		4	LIC-FURN-101 Atomizing Air

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT			OUTPUT			SET POINT	LOOP DEFINITION
		LOW	HI	UNIT	LOW	HI	UNIT		
13-PSLL-127C	*No*[2]	3	50	psig	0	0		35	LIC-FURN-101 Atomizing Air
13-PSLL-200	No	2.5	45	in. wc.	0	0		20	LIC-FURN-102 Comb. Air
13-PSLL-737A	No[2]	2	25	psig	0	0		12	LIC-FURN-101 Atomizing Air
13-PSLL-737B	No	2	8	psig	0	0		4	LIC-FURN-101 Atomizing Air
13-PSLL-737C	*No*[2]	3	50	psig	0	0		35	LIC-FURN-101 Atomizing Air
13-PSLL-741	No	10	45	in. wc.	0	0		20	LIC-BLOW-201 Discharge
13-PSLL-746	No	0.5	6	psig	0	0		1.5	LIC-FURN-201 Fuel Gas
13-PSLL-760	No	0	100	psig	0	0		20	LIC-FURN-201 Agent Feed
13-PSLL-791	No	0.5	6	psig	0	0		1.5	LIC-FURN-202 Fuel Gas Supply
13-PSLL-795	No	2.5	45	in. wc.	0	0		20	LIC-FURN-202 Comb. Air
13-PSLLL-112	No	0	100	psig	0	0		15	LIC-FURN-101 Agent Feed Pump S/D
13-PSLLL-733	No	0	100	psig	0	0		15	LIC-FURN-201 Agent Feed Pump S/D
13-PY-052	No	4	20	mA	9	15	psig		PAS-BLOW-104 Inlet I/P
13-PY-706	No	4	20	mA	9	15	psig		PAS-BLOW-204 Inlet I/P
13-TISHH-612	No	0	20	mA	0	0		19.4	LIC-FURN-101 Exhaust Refractory
13-TISHH-613	No	0	20	mA	0	0		18.66	LIC-FURN-102 Chamber
13-TISHH-712	No	0	20	mA	0	0		19.43	LIC-FURN-201 Exhaust Refractory
13-TISHH-713	No	0	20	mA	0	0		18.66	LIC-FURN-202 Chamber
13-TISHHH-371	No	4	20	mA	0	0		14.84	LIC-FURN 102 Slag Extension Zone 2 Refractory ETL
13-TISHHH-372	No	4	20	mA	0	0		15.4	LIC-FURN 102 Slag Extension Zone 3 Refractory ETL

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT			OUTPUT			SET POINT	LOOP DEFINITION
		LOW	HI	UNIT	LOW	HI	UNIT		
13-TISHHH-379	No	4	20	mA	0	0		15.4	LIC-FURN 102 Slag Extension Zone 1 Refractory ETL
13-TISHHH-571	No	4	20	mA	0	0		14.84	LIC-FURN 202 Slag Extension Zone 2 Refractory ETL
13-TISHHH-572	No	4	20	mA	0	0		15.4	LIC-FURN 202 Slag Extension Zone 3 Refractory ETL
13-TISHHH-579	No	0	20	mA	0	0		15.4	LIC-FURN 202 Slag Extension Zone 1 Refractory ETL
13-TIT-043	No	212	3,000	°F	4	20	mA		LIC-FURN-101 Exhaust refractory
13-TIT-045	No	212	3,000	°F	4	20	mA		LIC-FURN-101 Exhaust refractory
13-TIT-103	No	32	2,600	°F	4	20	mA		LIC-FURN-102 Exhaust
13-TIT-106	No	32	2,400	°F	4	20	mA		LIC-FURN-102 Chamber
13-TIT-125	No	212	3,000	°F	4	20	mA		LIC-FURN-101 Exhaust refractory
13-TIT-126	No	32	2,400	°F	4	20	mA		LIC-FURN-102 Exhaust refractory
13-TIT-127	No	212	3,000	°F	4	20	mA		LIC-FURN-101 Exhaust
13-TIT-128	No	32	2,600	°F	4	20	mA		LIC-FURN-102 Exhaust
13-TIT-129	Yes	32	2,400	°F	4	20	mA		LIC-FURN-102 Exhaust
13-TIT-191	No	0	250	°F	4	20	mA		LIC-BLOW-102 Exhaust
13-TIT-369	No	212	3,000	°F	4	20	mA		LIC-FURN 102 Slag Extension Zone 2 Refractory
13-TIT-370	No	212	3,000	°F	4	20	mA		LIC-FURN 102 Slag Heater Zone 2
13-TIT-371	No	212	3,000	°F	4	20	mA		LIC-FURN 102 Slag Heater Zone 2
13-TIT-372	No	212	3,000	°F	4	20	mA		LIC-FURN 102 Slag Heater Zone 2
13-TIT-373	No	32	2,400	°F	4	20	mA		LIC-FURN 102 Slag Extension Zone 3 Refractory
13-TIT-374	*Yes*	*0*	*1000*	°F	4	20	mA		LIC-FURN 102 *SRS Shell*

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT			OUTPUT			SET POINT	LOOP DEFINITION
		LOW	HI	UNIT	LOW	HI	UNIT		
13-TIT-375	*Yes*	*0*	*1000*	°F	4	20	mA		LIC-FURN 102 *SRS Shell*
13-TIT-376	*Yes*	*0*	*1000*	°F	4	20	mA		LIC-FURN 102 *SRS Shell*
13-TIT-377	*Yes*	*0*	*1000*	°F	4	20	mA		LIC-FURN 102 *SRS Shell*
13-TIT-378	No	32	2,400	°F	4	20	mA		LIC-FURN 102 Slag Extension Refractory
13-TIT-379	No	212	3,000	°F	4	20	mA		LIC-FURN 102 Slag Extension Zone 1 Refractory (Mid)
13-TIT-380	No	212	3,000	°F	4	20	mA		LIC-FURN 102 Slag Extension Zone 1 Refractory (Mid)
13-TIT-381	No	212	3,000	°F	4	20	mA		LIC-FURN 102 Slag Extension Zone 1 Refractory (Top)
13-TIT-393	No	0	120	°F	4	20	mA		Coolant from LIC-FURN-102 SRS Slide Gate
13-TIT-569	No	212	3,000	°F	4	20	mA		LIC-FURN 202 Slag Extension Zone 2 Refractory
13-TIT-570	No	212	3,000	°F	4	20	mA		LIC-FURN 202 Slag Extension Zone 2 Refractory
13-TIT-571	No	212	3,000	°F	4	20	mA		LIC-FURN 202 Slag Extension Zone 2 Refractory
13-TIT-572	No	212	3,000	°F	4	20	mA		LIC-FURN 102 Slag Extension Zone 3 Refractory
13-TIT-573	No	32	2,400	°F	4	20	mA		LIC-FURN 102 Slag Extension Zone 3 Refractory
13-TIT-574	*Yes*	*0*	*1000*	°F	4	20	mA		LIC-FURN 202 *SRS Shell*
13-TIT-575	*Yes*	*0*	*1000*	°F	4	20	mA		LIC-FURN 202 *SRS Shell*
13-TIT-576	*Yes*	*0*	*1000*	°F	4	20	mA		LIC-FURN 202 *SRS Shell*
13-TIT-577	*Yes*	*0*	*1000*	°F	4	20	mA		LIC-FURN 202 *SRS Shell*
13-TIT-578	No	32	2,400	°F	4	20	mA		LIC-FURN 202 Slag Extension Refractory

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT			OUTPUT			SET POINT	LOOP DEFINITION
		LOW	HI	UNIT	LOW	HI	UNIT		
13-TIT-579	No	212	3,000	°F	4	20	mA		LIC-FURN 202 Slag Extension Zone 1 Refractory (Mid)
13-TIT-580	No	212	3,000	°F	4	20	mA		LIC-FURN 202 Slag Extension Zone 1 Refractory (Mid)
13-TIT-581	No	212	3,000	°F	4	20	mA		LIC-FURN 202 Slag Extension Zone 1 Refractory (Top)
13-TIT-593	No	0	120	°F	4	20	mA		Coolant from LIC-FURN-202 SRS Slide Gate
13-TIT-610	Yes	212	3,000	°F	4	20	mA		LIC-FURN-101 Exhaust Refractory
13-TIT-611	No	32	2,400	°F	4	20	mA		LIC-FURN-102 Chamber
13-TIT-612	No	212	3,000	°F	4	20	mA		LIC-FURN-101 Exhaust Refractory
13-TIT-613	No	32	2,400	°F	4	20	mA		LIC-FURN-102 Chamber
13-TIT-615	No	32	2,400	°F	4	20	mA		LIC-FURN-102 Chamber
13-TIT-616	No	32	2,400	°F	4	20	mA		LIC-FURN-102 Chamber
13-TIT-710	Yes	212	3,000	°F	4	20	mA		LIC-FURN-201 Exhaust Refractory
13-TIT-711	No	32	2,400	°F	4	20	mA		LIC-FURN-202 Chamber
13-TIT-712	No	212	3,000	°F	4	20	mA		LIC-FURN-201 Exhaust Refractory
13-TIT-713	No	32	2,400	°F	4	20	mA		LIC-FURN-202 Secondary Chamber
13-TIT-715	No	32	2,400	°F	4	20	mA		LIC-FURN-202 Chamber
13-TIT-716	No	32	2,400	°F	4	20	mA		LIC-FURN-202 Chamber
13-TIT-752	No	212	3,000	°F	4	20	mA		LIC-FURN-201 Exhaust refractory
13-TIT-753	No	212	3,000	°F	4	20	mA		LIC-FURN-201 Exhaust refractory
13-TIT-754	No	212	3,000	°F	4	20	mA		LIC-FURN-201 Exhaust refractory
13-TIT-755	No	212	3,000	°F	4	20	mA		LIC-FURN-201 Exhaust
13-TIT-777	No	32	2,400	°F	4	20	mA		LIC-FURN-202 Chamber

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT			OUTPUT			SET POINT	LOOP DEFINITION
		LOW	HI	UNIT	LOW	HI	UNIT		
13-TIT-779	No	32	2,400	°F	4	20	mA		LIC-FURN-202 Exhaust refractory
13-TIT-780	No	32	2,600	°F	4	20	mA		LIC-FURN-202 Exhaust
13-TIT-781	No	32	2,600	°F	4	20	mA		LIC-FURN-202 Exhaust
13-TIT-782	Yes	32	2,400	°F	4	20	mA		LIC-FURN-202 Exhaust
13-TIT-858	No	0	250	°F	4	20	mA		LIC-BLOW-202 Exhaust
13-TIT-869	No	0	250	°F	4	20	mA		LIC-FURN-101 Comb. Air
13-TIT-874	No	0	250	°F	4	20	mA		LIC-FURN-201 Comb. Air
13-TSLL-129	Yes	4	20	mA	0	0		16.29	LIC-FURN-102 Exhaust
13-TSLL-610	Yes	4	20	mA	0	0		17.42	LIC-FURN-101 Exhaust refractory
13-TSLL-710	Yes	4	20	mA	0	0		17.42	LIC-FURN-201 Exhaust refractory
13-TSLL-782	Yes	4	20	mA	0	0		16.28	LIC-FURN-202 Exhaust
13-TSLL-612	No	4	20	mA	0	0		10.82	LIC-FURN-101 Exhaust refractory
13-TSLL-613	No	4	20	mA	0	0		13.24	LIC-FURN-102 Chamber
13-TSLL-712	No	4	20	mA	0	0		10.82	LIC-FURN-201 Exhaust refractory
13-TSLL-713	No	4	20	mA	0	0		13.24	LIC-FURN-202 Chamber
13-TSLLL-129	No[2]	4	20	mA	0	0		13.92	LIC-FURN-102 Exhaust
13-TSLLL-610	No[2]	4	20	mA	0	0		14.26	LIC-FURN-101 Exhaust refractory
13-TSLLL-611	No	4	20	mA	0	0		13.25	LIC-FURN-102 Chamber
13-TSLLL-612	No	0	20	mA	0	0		2.93	LIC-FURN-101 Exhaust Refractory
13-TSLLL-613	No	0	20	mA	0	0		4	LIC-FURN-102 Chamber
13-TSLLL-710	No[2]	4	20	mA	0	0		14.26	LIC-FURN-201 Exhaust refractory
13-TSLLL-711	No	4	20	mA	0	0		13.25	LIC-FURN-202 Chamber

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT			OUTPUT			SET POINT	LOOP DEFINITION
		LOW	HI	UNIT	LOW	HI	UNIT		
13-TSLLL-712	No	0	20	mA	0	0		2.93	LIC-FURN-201 Exhaust Refractory
13-TSLLL-713	No	0	20	mA	0	0		4	LIC-FURN-202 Chamber
13-TSLLL-782	No[2]	4	20	mA	0	0		13.9	LIC-FURN-202 Exhaust

[1] In the *March 1999* Loveland calibration database, these RCRA instruments were not listed and do not appear in this table: 13-FIT-127A, 13-FIT-731A, 13-FIT-102, and 13-FIT-763.
[2] In the *March 1999* Loveland calibration database, these instruments were erroneously identified as RCRA instruments.

APPENDIX G

Intercontroller Communications

LIC operations are or will be controlled by the following PLCs at each of the sites:

Table G.1 LIC Controllers at Each Site

Site	LIC #	PLC
ANCDF	NA	ICS-CONR-114
PBCDF	NA	ICS-CONR-114
TOCDF	LIC #1	ICS-CONR-114
	LIC #2	ICS-CONR-119
UMCDF	LIC #1	ICS-CONR-114
	LIC #2	ICS-CONR-119

The LIC is self-protecting when plant air, instrument air, process water, fuel gas, or feed loss occurs, so intercontroller communication with these utility systems is not required. No intercontroller communication is provided for HVAC which requires CON operator response.

Tables G.2, G.3, *and G.4* list the digital intercontroller inputs and outputs (DICIs/DICOs) for ICS-CONR-114 and ICS-CONR-119 at TOCDF*, and ICS-CONR-114 at ANCDF*. The DICIs/DICOs listed are based on the *February 2000* TOCDF code *and the January 2000 ANCDF code*. The *ANCDF and* TOCDF code*s were* used since site-specific code currently exists for *these sites* only.

Table G.2 TOCDF LIC 1 ICS-CONR-114 DICIs/DICOs

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
105	035	135	114	067	00	Primary Cooling Water System	Not Available	Available	0
106	035	135	114	069	00	Category "A" Sump Running	Stopped	Running	0
106	035	135	114	069	01	Category "B" Sump Running	Stopped	Running	0
106	035	135	114	069	02	Category "C" Sump Running	Stopped	Running	0
106	035	135	114	069	03	Agent Req'd for LIC-FURN-101	Not Req'd	Req'd	0
106	035	135	114	069	04	Spent Decon Req'd for LIC-FURN-102	Not Req'd	Req'd	0
106	*035*	*135*	*114*	*069*	*05*	*RCRA Sump 12-hour Alarm*		*Alarm*	*0*
106	*035*	*135*	*114*	*069*	*06*	*RCRA Sump 18-hour Alarm*		*Alarm*	*0*
106	035	135	114	069	10	Stop ACS-PUMP-101, Start ACS-PUMP-102	Spare not needed	Spare needed	0
109	035	135	114	075	00	PAS-BLOW-104A (Stage 1) Start/Running		Running	0
109	035	135	114	075	01	PAS-BLOW-104A (Stage 1) Stop		Stop	0
109	035	135	114	075	02	PAS-BLOW-104B (Stage 2) Start/Running		Running	0
109	035	135	114	075	03	PAS-BLOW-104B (Stage 2) Stop		Stop	0
110	035	135	114	077	15	Received Campaign Data		Rec'd	0
110	035	135	114	077	16	Request Campaign Data		Request	0
110	036	136	114	078	00	Screen D14 Diagnostic Adv. Alarm			0
110	036	136	114	078	01	Screen D14 Diagnostic Adv. Unack.			0
112	035	135	114	081	00	PAS-704 Not Online Timer	OK	Alarm	0
112	035	135	114	081	01	PAS-704B&C ACAMS Active	Normal	Trial Burn	0
113	035	135	114	083	00	ACAMS Switching/ PAS-703=704B PAS-705=704C		Activate	0
113	035	135	114	083	01	PAS-704=703C Operating Normal		Operating	0
113	035	135	114	083	02	PAS-704=703C Agent Alarm		Alarm	0
113	035	135	114	083	03	PAS-704 Chal/Serv/Rep		Offline	0

Table G.2 (Cont'd)

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
114	017	117	105	085	00	Plant Air Available (Sumps)		Available	0
114	019	119	106	085	00	Sump Pump Enable	Enabled	Inhibited	0
114	019	119	106	085	01	Spent Decon System Ready	Not ready	Ready	0
114	019	119	106	085	02	Agent Feed System Running		Running	0
114	019	119	106	085	03	Decon Feed System Running		Running	0
114	023	123	108	085	01	BRA Tanks Not Hi-Hi or Selected		Available	0
114	025	125	109	085	00	Electrical Power System Normal		Normal	0
114	025	125	109	085	01	Electrical System Total Power Loss		Power Loss	0
114	025	125	109	085	02	Start Essential Power Equipment		Start	0
114	031	131	112	085	00	PAS-701 Common Stack ACAMS Stop Feed		Alarm	0
114	031	131	112	085	01	PAS-701 Common Stack Agent Alarm		Alarm	0
114	033	133	113	085	00	Recovered Water Available		Available	0
114	033	133	113	085	01	PAS-704B Operating Normal		Normal	0
114	033	133	113	085	02	PAS-704B ACAMS Alarm		Alarm	0
114	033	133	113	085	03	PAS-704 = 703C ACAMS Switching		Activated	0
114	033	133	113	085	04	PAS-704B Chal/Serv/Rep		Offline	0
114	041	141	119	085	00	LIC-864 Controlling Spare Demister	on LD2	on LDS	1
114	041	141	119	085	01	XV-205A/B F.O. Purge Valves	Closed	Open	0
114	041	141	119	085	02	LIC-FURN-201 Purge Start		Start	0
114	041	141	119	085	03	LIC-FURN-201 20 min Air Purge Complete		Done	0
114	041	141	119	085	04	LIC-FURN-201 F.O. Purge Operator Stop		Stop	0
114	041	141	119	085	05	LIC-FURN-201 Agent Feed On		On	0
114	041	141	119	085	06	PAS-704C Operating Normal		Operating	0

Table G.2 (Cont'd)

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
114	041	141	119	085	07	PAS-704C ACAMS Alarm		Alarm	0
114	041	141	119	085	10	PAS-704=705C ACAMS Switching		Activate	0
114	041	141	119	085	11	PAS-704C Chal/Serv/Rep		Offline	0
117	*035*	*135*	*114*	*089*	*00*	*Airlock 569/570 ACAMS Not Online*		*Offline*	*0*
119	035	135	114	091	00	LIC-143 controlling spare demister	on LD1	on LDS	0
119	035	135	114	091	01	F.O. Purge low flow alarm		low flow	0
119	035	135	114	091	02	F.O. Purge high flow alarm		high flow	0
119	035	135	114	091	03	F.O. Purge complete alarm		Complete	0
119	035	135	114	091	05	ACAMS Switching/ PAS-704=705C		Activate	0
119	035	135	114	091	06	PAS-704=705C Operating Normal		Operating	0
119	035	135	114	091	07	PAS-704=705C Agent Alarm		Alarm	0
119	035	135	114	091	10	PAS-704 Chal/Serv/Rep		Offline	0

Table G.3 TOCDF LIC 2 ICS-CONR-119 DICIs/DICOs

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
106	041	141	119	069	03	Agent Req'd for LIC-FURN-201	Not Req'd	Req'd	0
106	041	141	119	069	04	Spent Decon Req'd for LIC-FURN-202	Not Req'd	Req'd	0
106	041	141	119	069	10	Stop ACS-PUMP-201, Start ACS-PUMP-102	Spare not needed	Spare needed	0
109	041	141	119	075	00	PAS-BLOW-204A (Stage 1) Start/Running		Running	0
109	041	141	119	075	01	PAS-BLOW-204A (Stage 1) Stop		Stop	0
109	041	141	119	075	02	PAS-BLOW-204B (Stage 2) Start/Running		Running	0
109	041	141	119	075	03	PAS-BLOW-204B (Stage 2) Stop		Stop	0
110	041	141	119	077	15	Received Campaign Data		Rec'd	0
110	041	141	119	077	16	Request Campaign Data		Request	0
110	042	142	119	078	00	Screen D19 Diagnostic Adv. Alarm			1
110	042	142	119	078	01	Screen D19 Diagnostic Adv. Unack.			1
112	041	141	119	081	00	PAS-705 Not Online Timer	OK	Alarm	1
112	041	141	119	081	01	PAS-702C Operating Normal	Offline	Normal	0
112	041	141	119	081	02	PAS-702C ACAMS Alarm	Normal	Alarm	0
112	041	141	119	081	03	PAS 702=703	Normal	Activate	0
112	041	141	119	081	04	PAS-705 Chal/Serv/Rep		Offline	0
113	041	141	119	083	00	ACAMS Switching/ PAS-703=705B		Activate	1
114	041	141	119	085	00	LIC-864 Controlling Spare Demister	on LD2	on LDS	1
114	041	141	119	085	01	XV-205A/B F.O. Purge Valves	Closed	Open	0
114	041	141	119	085	02	LIC-FURN-201 Purge Start		Start	0
114	041	141	119	085	03	LIC-FURN-201 20 min Air Purge Complete		Done	0
114	041	141	119	085	04	LIC-FURN-201 F.O. Purge Operator Stop		Stop	0

Table G.3 (Cont'd)

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
114	041	141	119	085	05	LIC-FURN-201 Agent Feed On		On	0
114	041	141	119	085	06	PAS-704C Operating Normal		Operating	0
114	041	141	119	085	07	PAS-704C ACAMS Alarm		Alarm	0
114	041	141	119	085	10	PAS-704=705C		Activate	0
114	041	141	119	085	11	PAS-705 Chal/Serv/Rep		Offline	0
119	019	119	106	091	02	Agent Feed System Running		Running	0
119	019	119	106	091	03	Decon Feed System Running		Running	0
119	020	120	106	092	01	Spent Decon System Ready	Not ready	Ready	0
119	023	123	108	091	01	BRA Tanks Not Hi-Hi or Selected		Available	0
119	024	124	108	092	00	High Level in any BRA Tanks 101/102/201/202	Shutdown	OK	0
119	025	125	109	091	00	Electrical Power System Normal		Normal	0
119	025	125	109	091	01	Electrical System Total Power Loss		Power Loss	0
119	025	125	109	091	02	Start Essential Power Equipment		Start	0
119	031	131	112	091	00	PAS-701 Common Stack ACAMS Stop Feed		Alarm	0
119	031	131	112	091	01	PAS-701 Common Stack Agent Alarm		Alarm	0
119	031	131	112	091	03	PAS-702C Duct from DFS to PAS		Activated	0
119	033	133	113	091	00	Recovered Water Available		Available	0
119	033	133	113	091	01	PAS-703=705B Operating Normal		Normal	0
119	033	133	113	091	02	PAS-703=705B ACAMS Alarm		Alarm	0
119	033	133	113	091	03	PAS-703=705B Chal/Serv/Rep		Offline	0
119	035	135	114	091	00	LIC-143 controlling spare demister	on LD1	On LDS	0
119	035	135	114	091	01	F.O. Purge low flow alarm		Low flow	0
119	035	135	114	091	02	F.O. Purge high flow alarm		High flow	0
119	035	135	114	091	03	F.O. Purge complete alarm		Complete	0

Table G.3 (Cont'd)

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
119	035	135	114	091	05	ACAMS Switching/ PAS-704=705C		Activate	0
119	035	135	114	091	06	PAS-704=705C Operating Normal		Operating	0
119	035	135	114	091	07	PAS-704=705C Agent Alarm		Alarm	0
119	035	135	114	091	10	PAS-704 Chal/Serv/Rep		Offline	0

Table G.4 ANCDF LIC ICS-CONR-114 DICIs/DICOs

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
106	035	135	114	069	00	Category "A" Sump Running	Stopped	Running	0
106	035	135	114	069	01	Category "B" Sump Running	Stopped	Running	0
106	035	135	114	069	02	Category "C" Sump Running	Stopped	Running	0
106	035	135	114	069	03	Agent Req'd for LIC-FURN-201	Not Req'd	Req'd	0
106	035	135	114	069	04	Spent Decon Req'd for LIC-FURN-202	Not Req'd	Req'd	0
106	035	135	114	069	05	RCRA Sump 12-hour Alarm		Alarm	0
106	035	135	114	069	06	RCRA Sump 18-hour Alarm		Alarm	0
106	035	135	114	069	10	Stop ACS-PUMP-201, Start ACS-PUMP-102	Spare not needed	Spare needed	0
109	035	135	114	075	01	PAS-BLOW-204A (Stage 1) Stop		Stop	0
109	035	135	114	075	03	PAS-BLOW-204B (Stage 2) Stop		Stop	0
110	035	135	114	077	15	Received Campaign Data		Rec'd	0
110	035	135	114	077	16	Request Campaign Data		Request	0
110	036	136	114	078	00	Screen D14 Diagnostic Adv. Alarm			0
110	036	136	114	078	01	Screen D14 Diagnostic Adv. Unack.			0
112	035	135	114	081	00	PAS-705 Not Online Timer	OK	Alarm	0
112	035	135	114	081	01	PAS-705B&C ACAMS Active	Normal	Trial Burn	0
112	036	136	114	082	00	XV-450A Bypass Damper		Open	0
112	036	136	114	082	01	XV-450B Bypass Damper		Closed	0
112	036	136	114	082	02	XV-415/416A FILT-113 Access Damper		Open	0
112	036	136	114	082	03	XV-415/416B FILT-113 Access Damper		Closed	0
112	036	136	114	082	04	XV-436/437A FILT-209 In/Out Damper		Open	0
112	036	136	114	082	05	XV-436/437B FILT-209 In/Out Damper		Closed	0

Table G.2 (Cont'd)

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
112	036	136	114	082	06	XV-410/409A PAS ID Fan Access Damper		Open	0
112	036	136	114	082	07	XV-410/409B PAS ID Fan Access Damper		Closed	0
112	036	136	114	082	10	Request for FILT-113		Request	0
113	035	135	114	083	00	ACAMS Switching/ PAS-703=704B PAS-705=704C		Activate	0
113	035	135	114	083	01	PAS-705=703C Operating Normal		Operating	0
113	035	135	114	083	02	PAS-705=703C Agent Alarm		Alarm	0
113	035	135	114	083	03	PAS-705 Chal/Serv/Rep		Offline	0
113	036	136	114	084	00	XV-450A Bypass Damper		Open	0
113	036	136	114	084	01	XV-450B Bypass Damper		Closed	0
113	036	136	114	084	02	XV-415/416A FILT-113 Access Damper		Open	0
113	036	136	114	084	03	XV-415/416B FILT-113 Access Damper		Closed	0
113	036	136	114	084	04	XV-436/437A FILT-209 In/Out Damper		Open	0
113	036	136	114	084	05	XV-436/437B FILT-209 In/Out Damper		Closed	0
113	036	136	114	084	06	XV-410/409A PAS ID Fan Access Damper		Open	0
113	036	136	114	084	07	XV-410/409B PAS ID Fan Access Damper		Closed	0
113	036	136	114	084	10	Request for FILT-113		Request	0
114	017	117	105	085	00	Plant Air Available (Sumps)		Available	0
114	019	119	106	085	00	SDS Tanks Full, Inhibit Sump Pumps	Pumps Enabled	Pumps Inhibited	0
114	019	119	106	085	01	Spent Decon System Ready	Not ready	Ready	0
114	019	119	106	085	02	Agent Feed System Running		Running	0
114	019	119	106	085	03	Decon Feed System Running		Running	0
114	023	123	108	085	01	BRA Tanks Not Hi-Hi or Selected		Available	0

Table G.2 (Cont'd)

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
114	025	125	109	085	00	Electrical Power System Normal		Normal	0
114	025	125	109	085	01	Electrical System Total Power Loss		Power Loss	0
114	025	125	109	085	02	Start Essential Power Equipment		Start	0
114	031	131	112	085	00	PAS-701 Common Stack ACAMS Stop Feed		Alarm	0
114	031	131	112	085	01	PAS-701 Common Stack Agent Alarm		Alarm	0
114	032	132	112	085	00	XV-449A Bypass Damper		Open	0
114	032	132	112	085	01	XV-449B Bypass Damper		Closed	0
114	032	132	112	085	02	XV-440/441A FILT-111 In/Out Damper		Open	0
114	032	132	112	085	03	XV-440/441B FILT-111 In/Out Damper		Closed	0
114	032	132	112	085	04	XV-442/443A FILT-112 In/Out Damper		Open	0
114	032	132	112	085	05	XV-442/443B FILT-112 In/Out Damper		Closed	0
114	032	132	112	085	06	XV-413/414A FILT-113 Access Damper		Open	0
114	032	132	112	085	07	XV-413/414B FILT-113 Access Damper		Closed	0
114	032	132	112	085	10	Request for FILT-113		Request	0
114	032	132	112	085	11	Request for FILT-110		Request	0
114	032	132	112	085	12	Request for FILT-209		Request	0
114	032	132	112	085	13	Request for FILT-209		Request	0
114	033	133	113	085	00	Recovered Water Available		Available	0
114	033	133	113	085	01	PAS-705B Operating Normal		Normal	0
114	033	133	113	085	02	PAS-705B ACAMS Alarm		Alarm	0
114	033	133	113	085	03	PAS-705 = 703C ACAMS Switching		Activated	0
114	033	133	113	085	04	PAS-705B Chal/Serv/Rep		Offline	0

Table G.2 (Cont'd)

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
114	034	134	113	085	00	XV-093A Bypass Damper		Open	0
114	034	134	113	085	01	XV-093B Bypass Damper		Closed	0
114	034	134	113	085	02	XV-094/095A FILT-113 Access Damper		Open	0
114	034	134	113	085	03	XV-094/095B FILT-113 Access Damper		Closed	0
114	034	134	113	085	04	XV-438/439A FILT-110 In/Out Damper		Open	0
114	034	134	113	085	05	XV-438/439B FILT-110 In/Out Damper		Closed	0
114	034	134	113	085	06	XV-487/488A FILT-113 In/Out Damper		Open	0
114	034	134	113	085	07	XV-487/488B FILT-113 In/Out Damper		Closed	0
114	034	134	113	085	10	XV-131/132A PAS ID Fan Access Damper		Open	0
114	034	134	113	085	11	XV-131/132B PAS ID Fan Access Damper		Closed	0

APPENDIX H

References

PROGRAMMATIC

CSDP Control Systems Software Design Guide, Revision 19, 3-12-93.

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ANCDF (*through Change Case AN-06-18-150, Revision 1*)

ANCDF System Hazard Analysis, November 1997.

ANCDF LIC Furnace Mass and Energy Balances, Rev.7, April 1998.

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AN-00-E-956, *Rev.15, 11-5-99*	Electrical, Conduit & Cable Schedule
AN-00-E-958, *Rev.15, 11-5-99*	Electrical, Conduit & Cable Schedule
AN-1-D-546, *Rev.8, 8-20-99*	LIC Furnace - Primary Chamber, P&ID
AN-1-D-547/1, *Rev.5, 8-20-99*	LIC Furnace - Secondary Chamber, P&ID
AN-1-D-547/2, Rev.2, 6-13-97	LIC Furnace - Secondary Chamber, P&ID
AN-1-D-581, Rev.0, 1-2-96	LIC Furnace – Slag Removal System, P&ID
AN-1-D-582, Rev.1, 1-5-96	LIC Furnace - Slag Removal System, P&ID
AN-16-D-13, Rev.1, 1-5-96	LIC Fuel Oil Purge System, P&ID
AN-1-E-501, *Rev.3, 5-8-98*	MDB First Floor Area 1-1, Electrical Power Plan
AN-1-E-502, *Rev.3, 5-8-98*	MDB First Floor Area 1-2 & Partial Plan UPS Room, Electrical Power Plan
AN-1-E-510/1, *Rev.2, 5-8-98*	MDB First Floor Area 1-10 & Partial Plan Area 1-1, Electrical Power Plan
AN-1-E-608, Rev.0, 1-2-96	LIC Pit Area 1-1, Electrical Power Plan
AN-1-E-905, *Rev.3, 8-28-98*	SPS-MCC-101 480V MCC - Essential No.1, Single Line Diagram

ANCDF (cont'd)

AN-1-E-911, *Rev.3, 5-8-98*	SPS-MCC-107 480V MCC - MPF/LIC Single Line Diagram
AN-1-F-506, *Rev.5, 10-2-98*	LIC Process Flow Diagram

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PB-00-E-950, *Rev.10, 2-25-00*	Electrical, Conduit & Cable Schedule
PB-00-E-952, *Rev.10, 2-25-00*	Electrical, Conduit & Cable Schedule
PB-1-D-525, *Rev.4, 7-10-98*	LIC Furnace – Primary Chamber, P&ID
PB-1-D-526, *Rev.5, 2-25-00*	LIC Furnace – Secondary Chamber, P&ID
PB-1-D-527, *Rev.2, 2-25-00*	LIC Furnace – Secondary Chamber, P&ID
PB-1-D-571, *Rev.0, 6-2-97*	LIC Furnace – Slag Removal System, P&ID
PB-1-D-572, *Rev.1, 2-25-00*	LIC Furnace – Slag Removal System, P&ID
PB-16-D-13, *Rev.1, 7-10-98*	LIC Fuel Oil Purge System, P&ID
PB-1-E-508, *Rev.1, 2-25-00*	First Floor Area 1-8, Electrical Power Plan
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UM-1-E-510/2, *Rev.0, 1-30-97*	MDB First Floor Area 1-11, Electrical Power Plan
UM-1-E-608, *Rev.0, 1-30-97*	LIC Pit Area 1-1, Electrical Power Plan
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